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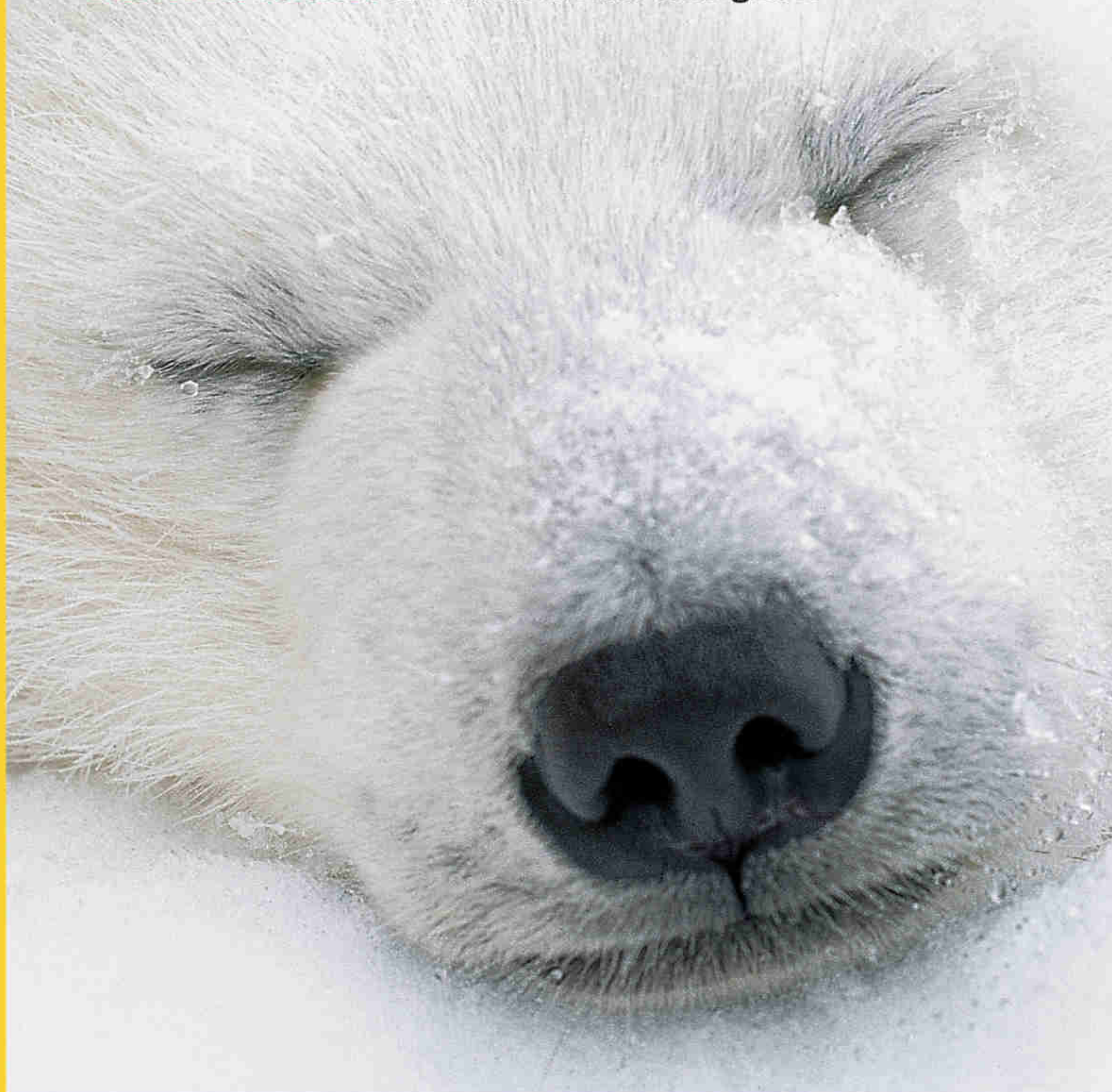
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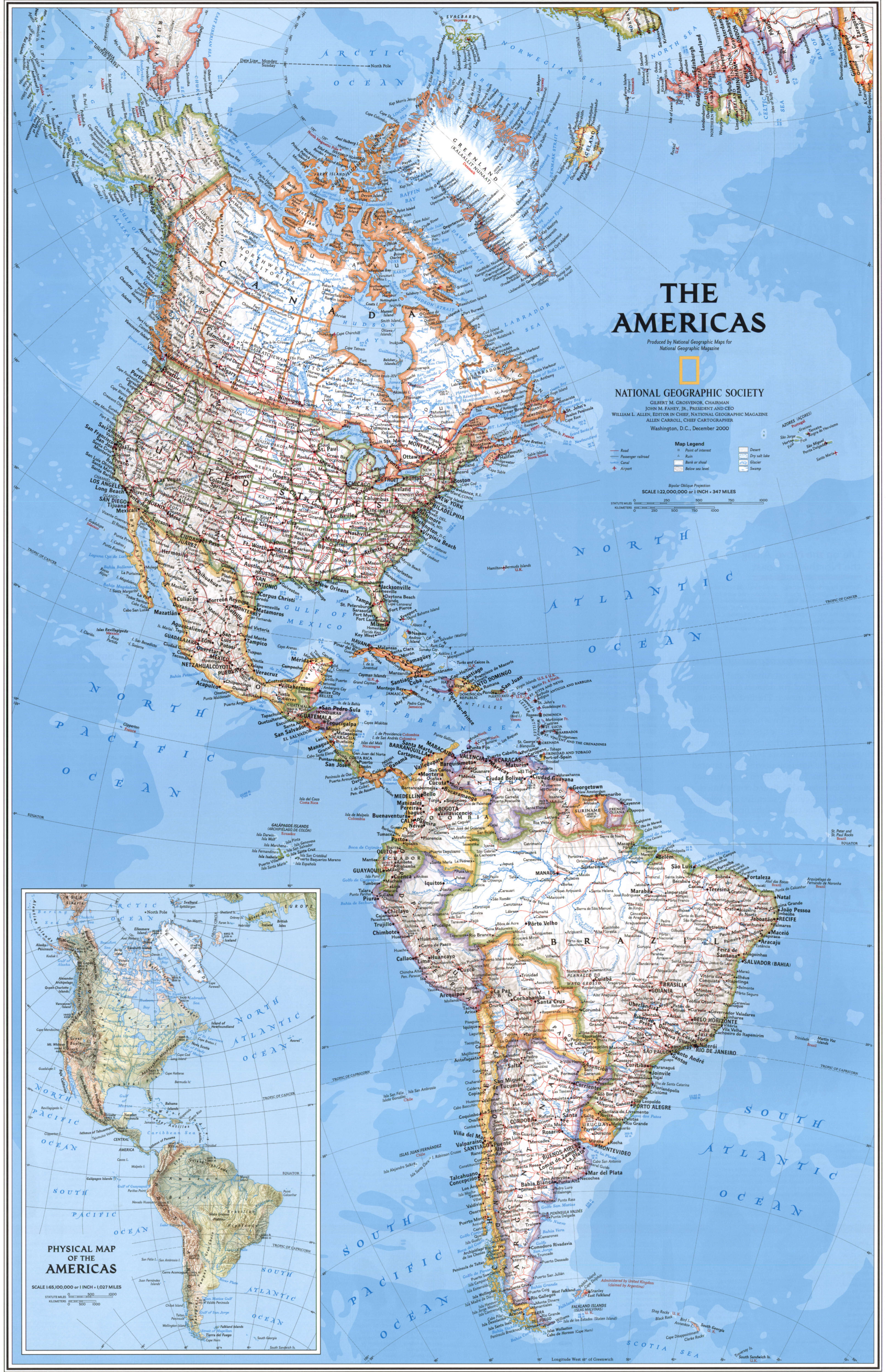
NATIONAL GEOGRAPHIC

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THE DAWN OF HUMANS

Peopling of the Americas

Produced by National Geographic Maps for National Geographic Magazine

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NATIONAL GEOGRAPHIC MAGAZINE
ALLEN CARROLL, CHIEF CARTOGRAPHER
Washington, D.C., December 2000



Life on the Move Along the Northwest Coast

Tracking big game and crafting deadly stone points for spears and other weapons have long been among the skills attributed to the first occupants of the Americas. Many researchers now believe the immigrants could also build boats of wood and skins—and were accomplished needleworkers. "To survive in the Arctic," says Smithsonian anthropologist Dennis Stanford, "people had to have excellent waterproof seams."



Proposed peopling routes

- Coastal route (20,000 to 15,000 years ago)
- Overland route (14,000 years ago)
- Atlantic paleoceanic route (24,000 to 18,000 years ago)

Vegetation and glaciation 21,000 years ago

- Open forest
- Grassland
- Forest
- Scrubland
- Savanna
- Desert
- Tundra
- Glacier
- Sea ice

Early American sites

- Pre-Clovis (more than 13,500 years ago)
- Paleo-Indian (13,500 to 10,900 years ago)
- Early Archaic (10,900 to 7,000 years ago)

Animal remains and artifacts

- Human remains and artifacts

Designated National Historic Landmark underlined in red. Present-day shoreline and political boundaries shown in gray. Dates based on radiocarbon results are calibrated to reflect calendar years.

SCALE 1:22,000,000 or 1 INCH = 347 MILES

BIPOLAR OBLIQUE PROJECTION

STATUTE MILES 0 100 200 300

KILOMETERS 0 100 200 300

Hunting and Gathering in South America

Whirling stone bolas helped hunters—generally assumed to have been men—bring down llama-like animals for meat. But meat was only one component of the Ice Age diet. As migrating groups settled into new surroundings, edible fruits, nuts, roots, and other plant foods were identified and eaten. Women and even children made a substantial contribution to the support of the group, probably by gathering the seasons' changing wild fare.



STONE STORY

Most items in the early American toolkit were perishable; the human-made objects—stone tools, spear points, and blades—were the only things that could survive long burial—stone tools. Among the most common tools

COOL TIMES

At the peak of the last ice age around 20,000 years ago, glaciers would have stopped humans from migrating along inland routes from Beringia to the Americas. Temperatures were about ten degrees cooler than they are now; sea levels were more than 400 feet lower. Sites of possible human habitation that may predate that time have been found in the Americas—all have been challenged.

found in digs dating to the last ice age are points and blades chipped from chert and other rocks. Some were hide-piercing projectile tips; others were used to cut or scrape. Many could be used for multiple tasks. The points,

CACTUS HILL

Stone spearpoints are among the artifacts found in several levels at the sandy Cactus Hill dig though not in the earliest, which may be 18,000 years old—a date questioned by some researchers.

says archaeologist Michael Collins, have an "elegant lethality." Ancient tools have been found from Alaska to Chile (major sites shown on maps below) where melting glaciers yielded land habitable by humans.

MONTE VERDE

The oldest American site whose age—14,800 years—is accepted by most archaeologists, Monte Verde held many perishables, from grass tissue to remains of butchered mastodons, probably killed with spear points like this.

CLOVIS

The people who made Clovis points 13,500 to 12,900 years ago remain—for now—the earliest universally accepted American culture.

OPEN CORRIDOR

Glaciers melted as the world warmed, opening an ice-free corridor from Beringia to the south. Some scientists believe Clovis hunters then moved south in pursuit of large prey—bison, mammoths, mastodons—and were the first humans in North America. But based on sites he has studied and input from other sciences, archaeologist James Dixon suggests that earlier inhabitants followed the receding ice north as the corridor formed.

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FOLSOM

The 1926 discovery of a Folsom point between the ribs of an extinct bison was the first definitive proof that humans lived in the Americas during the Ice Age. The groove, or flute, along the side is a Folsom characteristic.

FELL'S CAVE

Fish-tail-shaped points nearly as old as Clovis are found in southern Chile. To some this is evidence of the rapid spread of Clovis culture.

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New Routes From the Old World

The idea that a single migration—from Siberia by way of the Bering land bridge—led to the peopling of two continents is being challenged by a host of alternative "first American" hypotheses. There may not be a simple answer; over tens of thousands of years waves of settlers may have journeyed here from many origins.

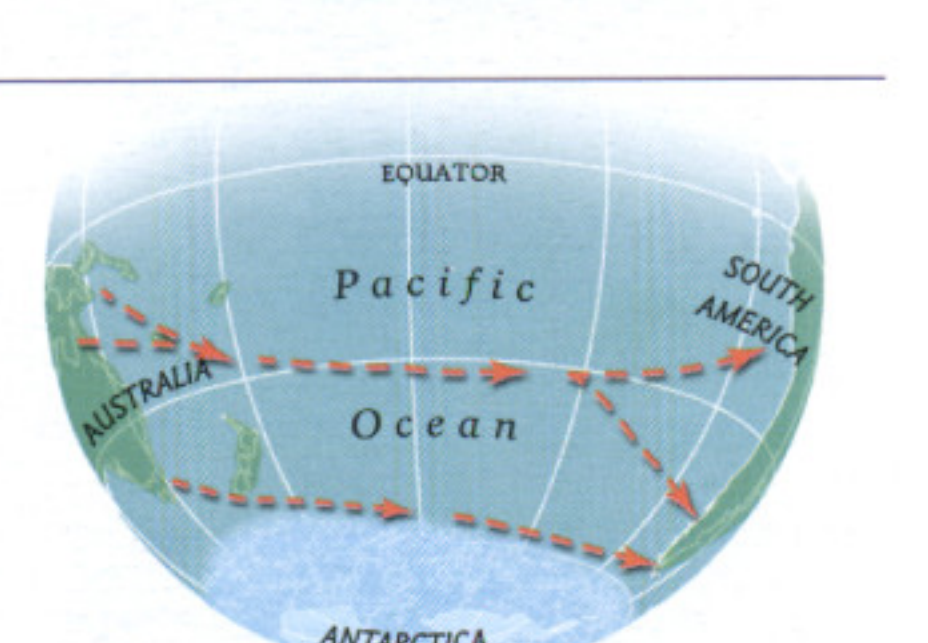
Skirting the Ice From Asia?

By 17,000 years ago melting glaciers had exposed ice-free havens along the North Pacific coast. If the first Americans came out of Asia, either walking from the interior or following the shoreline in boats, such refuges would have offered hospitable territory for those who chose to settle and relatively easy travel for those driven to keep moving.



An Epic Pacific Journey?

Researchers think the first people to settle in Australia crossed 80 miles of open water some 60,000 years ago. Some physical anthropologists and linguists see resemblances among native peoples of Australia, Southeast Asia, and South America. Could the earliest South Americans have traveled across thousands of miles of Pacific Ocean? The challenges seem insurmountable, yet the possibility remains intriguing.



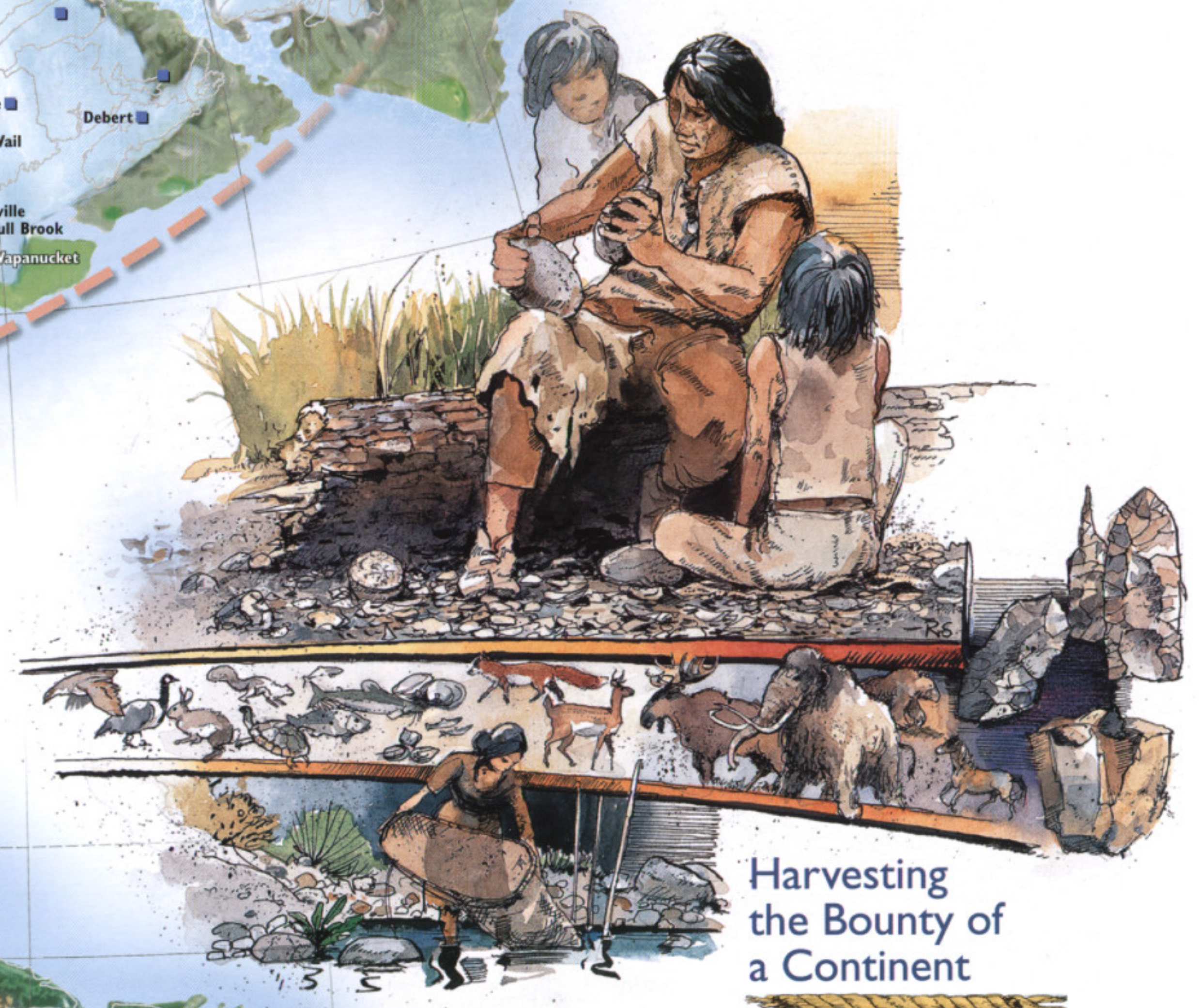
Early European Influences?

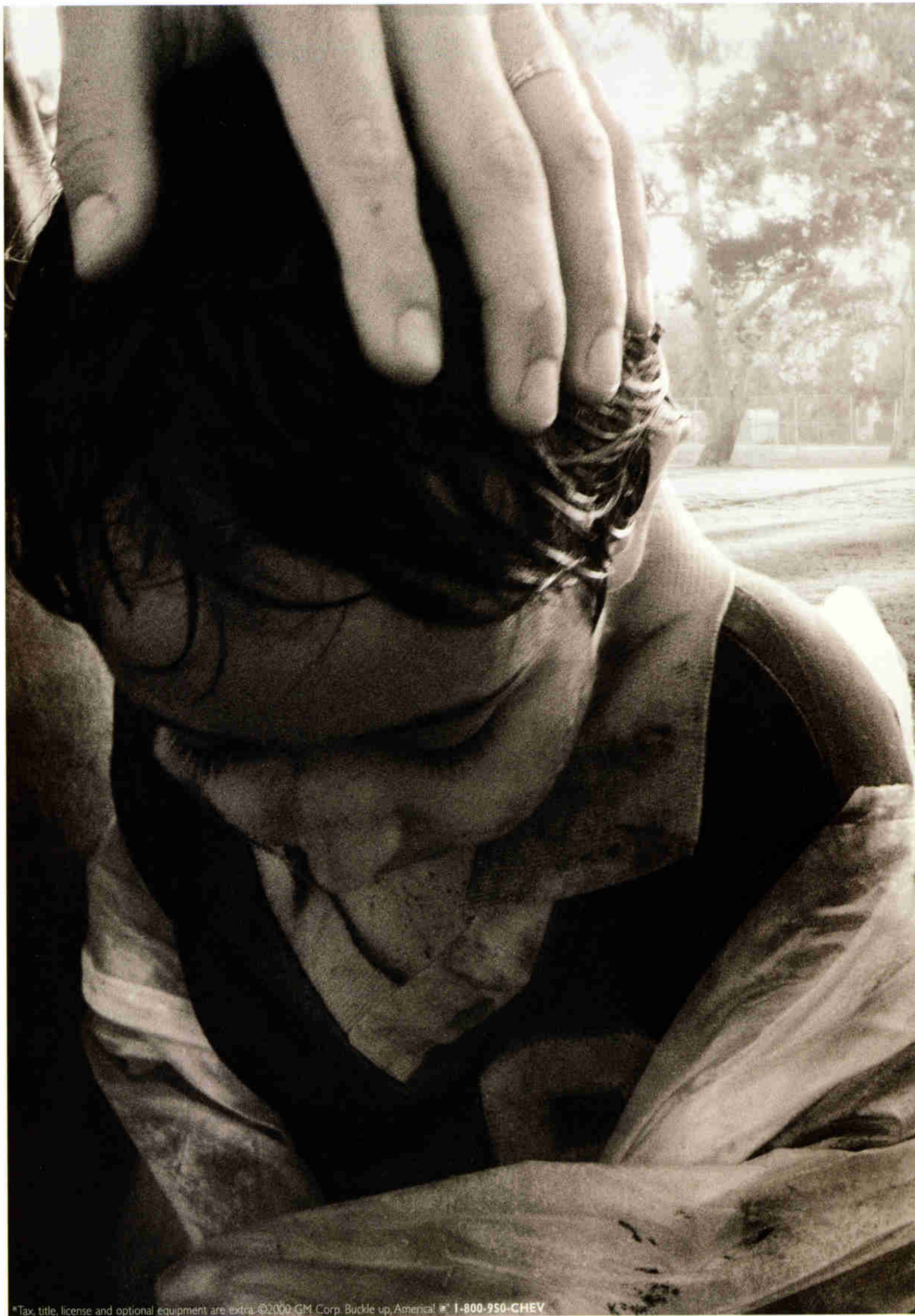
Anthropologists Dennis Stanford and Bruce Bradley see similarities between tools from eastern North America and those from a southwestern European culture, the Solutrean, that faded away about 19,000 years ago. Though the two scientists acknowledge that a direct link may never be proved, they believe it's important to explore the hypothesis that Europeans participated in the first settling of the Americas.



Harvesting the Bounty of a Continent

Mammoth, caribou, and elk promised huge meat feasts to successful North American hunters. Smaller prey such as rabbits, squirrels, and turtles, along with shellfish and waterfowl found along shores, offered sustenance with much less risk. Archaeologist James Adovasio suggests that nets, snares, and baskets—tools made of perishable wood and fiber—were far more common in Ice Age life than the enduring stone weapons of the big-game hunters.





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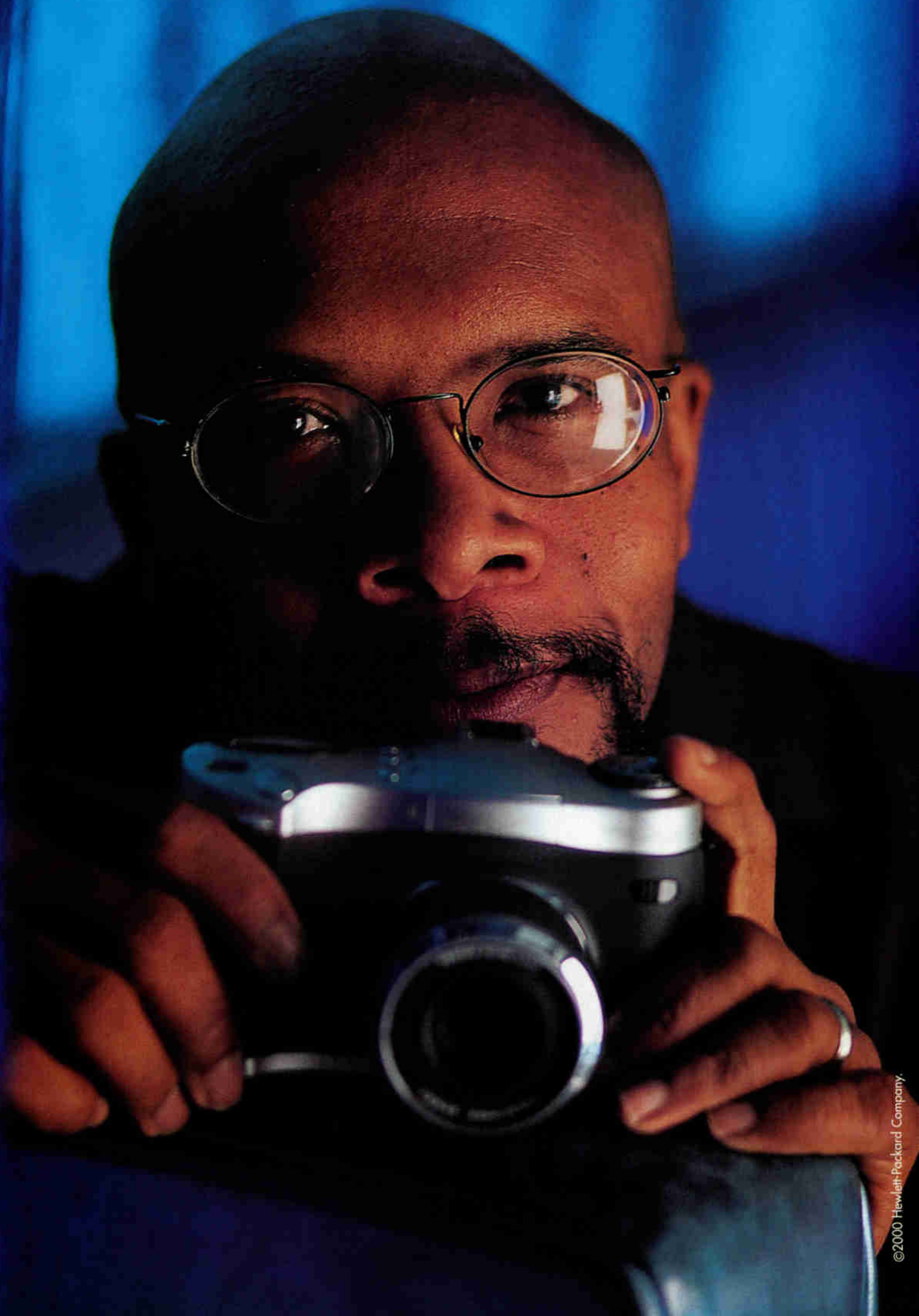


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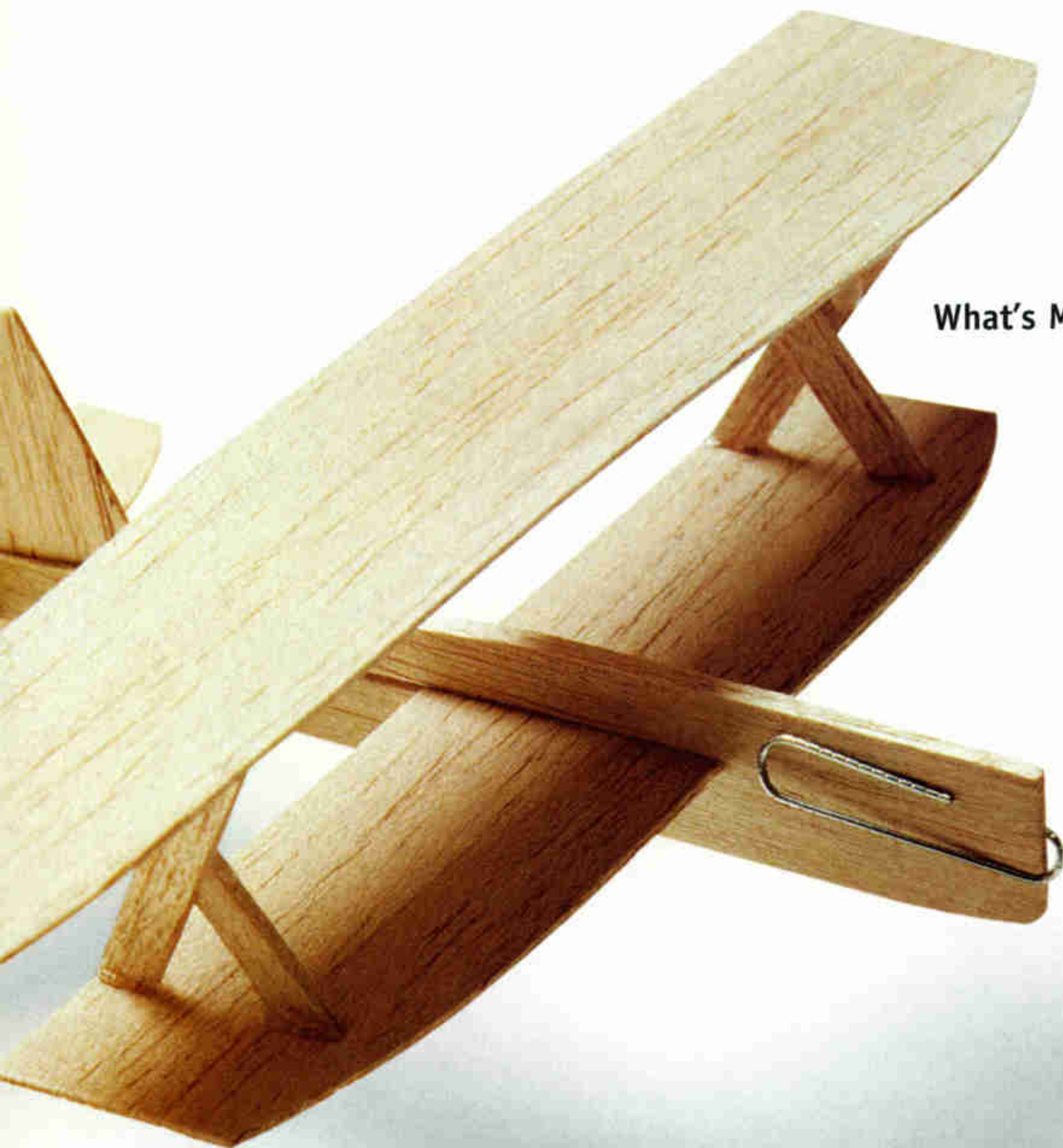
Reuben Jackson. Inventor.





Inspiration is all around us. Reuben finds
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requires new kinds of tools.
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What's Mr. Robinson's class up to now?

75 feet to be exact. That's how high some of the machines they've built will fly. These gravity-defying gizmos are just part of Jason Robinson's innovative, hands-on approach to teaching aerodynamics to his fourth graders.

For getting his kids sky-high on physics and science, State Farm is pleased to present Mr. Robinson with our Good Neighbor Teacher Award™ and to donate \$5,000 to his school, Taylor Elementary, in Cleveland, Tennessee.



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THE COVER

A polar bear cub naps after an active afternoon pestering the scientists studying its tranquilized mother nearby.

PHOTOGRAPH BY
NORBERT ROSING

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Grab a Powdermilk Biscuit on your way through the kitchen and come along with me to a place where all the women are strong, all the men are good-looking, and all the children are above average. Many U.S. readers know there's only one place like that—a quiet town in central Minnesota called Lake Wobegon. It isn't like the places we normally take you, such as the fiords of New Zealand, Africa's Blue Nile River, China, and North Pole, Alaska, in this month's issue. It is much more exotic.

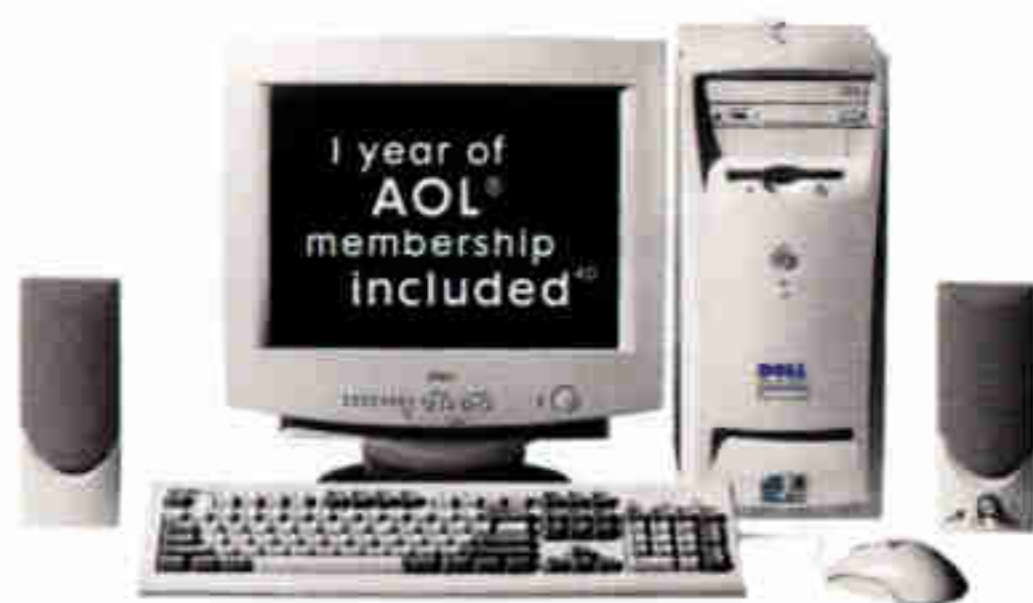
This geographic anomaly springs from the fertile imagination of Minnesota's native son Garrison Keillor—writer, humorist, radio personality, and frequent visitor to the Side-track Tap. Read (and listen on our website) as Garrison describes the founding of this center of neighborliness, church suppers, and homecoming parades and its cast of taciturn Norwegian Lutherans and nose-to-the-grindstone German Catholics. In so doing, he reveals a Garrison Keillor you don't know.

We called on Richard Olsenius, another Minnesotan, to evoke this mythical place. His black-and-white images capture the feeling of small-town America and a sense of community that is all too often lost today. So throw another log on the fire, and join Garrison and Richard in their personal journey "In Search of Lake Wobegon."

Bill Allen

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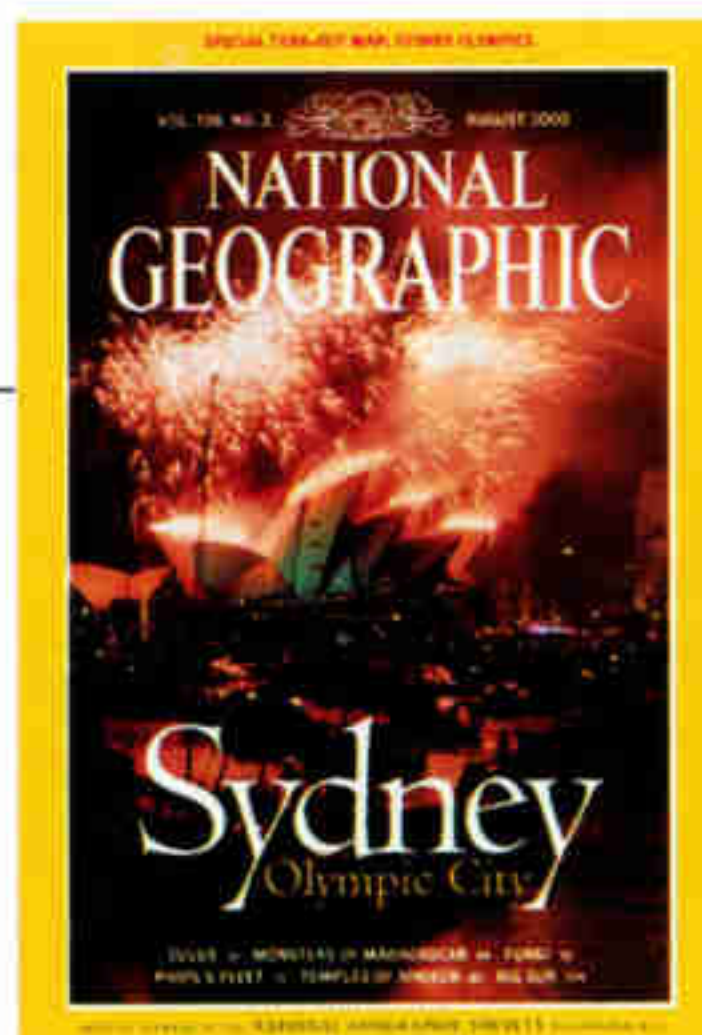
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Forum

August 2000

After seeing our cover story on Sydney, Australia, a reader from Dallas, Texas, wrote: "I now know why there are not a lot of Aussies in the U.S.A. They would be crazy to leave such a beautiful country."



Sydney

You err in your comparison of Sydney and Melbourne in the late fifties. As a New Zealand cadet at Royal Australian Naval College then, I knew both cities and observed the intense rivalry between them. Sydneysiders chortled when Ava Gardner, in Melbourne in 1958 with Gregory Peck to film Nevil Shute's apocalyptic *On the Beach*, gave her opinion of Melbourne. "This film is about the end of the world. They certainly came to the right place to make it."

R. LEA CLOUGH
Chatham Island, New Zealand

The Melbourne journalist who quoted the actress penned this sentiment himself, according to Cassell Companion to Quotations by Nigel Rees.

There is not one Aboriginal face in any of the photos accompanying the article. Sydney may be a city of opportunity for many, but I'm not sure the Aborigines would think so.

TANYA GREGSON
Leeds, England

While the Sydney Opera House is a widely recognized icon, it also proves my theory that award-winning architecture and functional design are mutually exclusive. The Opera House looks great from the outside,

but inside the main theater is too small. The Australian Ballet has to specially design its sets to fit the stage, and orchestra members have to wear earplugs because the sound is too loud.

SIMON NETTLETON
Lavington, Australia

People of Heaven

You seem to find it strange that a Zulu king can be a "devout Anglican" and husband to five wives. But the king who founded Anglicanism also had five wives, not counting the wife he had before he launched his new career as a theologian. The Zulu king differs in that he has his five in concert, while Henry VIII had his serially, beheading or divorcing those who proved a disappointment.

RICHARD WHITE
East Lyme, Connecticut

The British defeat at Isandlwana was helped by another mistake: a shortage of screwdrivers designed to open the ammunition boxes. The boxes were wooden and bound with thick copper straps held together with heavy slot-head screws. When the British troops emptied their bandoliers, they were left with only bayonets to face an enemy equipped with spears and the discipline of a Roman legion.

GEORGE K. GODLEWSKI
Saratoga, California



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Phips's Fleet

It was interesting to read of Sir William Phipps's (our local spelling) expedition against Quebec in 1690. We know him as the Massachusetts governor who ended the infamous 1692 Salem witch trials.

EDWARD W. CARBERG
Salem, Massachusetts

For those interested in the "failed battle of October 1690," a visit to Canada's Quebec City should include Notre-Dame-des-Victoires. The little church, named Notre-Dame-de-la-Victoire after Sir William Phipps's hasty departure, was renamed in the plural after another disastrous seaborne attack by Sir Hovenden Walker in 1711.

FRASER M. MCKEE
Markdale, Ontario

Why would the English fleet be flying a Union flag [page 77 and right] in 1690 when the union of Scotland and England did not happen until 1707?

EDWARD MEANS
El Dorado Hills, California

Reflecting his desire for union, King James I created the Union flag in 1606, ordering all Scottish and English vessels to display it upon meeting. In a letter dated December 3, 1690, a member of Phips's crew wrote, "All rode with the Union flag."

Increase Modisley, thought to be the owner of the porringer pictured on page 74, was married to my umpteen times great-aunt Sarah Trescott, of Dorchester, Massachusetts. Sarah also lost a brother, a



ART BY FRANCIS BACK

brother-in-law, and a nephew in the so-called Expedition to Canada during King William's War. This little-known conflict took a heavy toll in New England, where many frontier settlements were abandoned.

BARBARA BARTELS
Pomeroy, Washington

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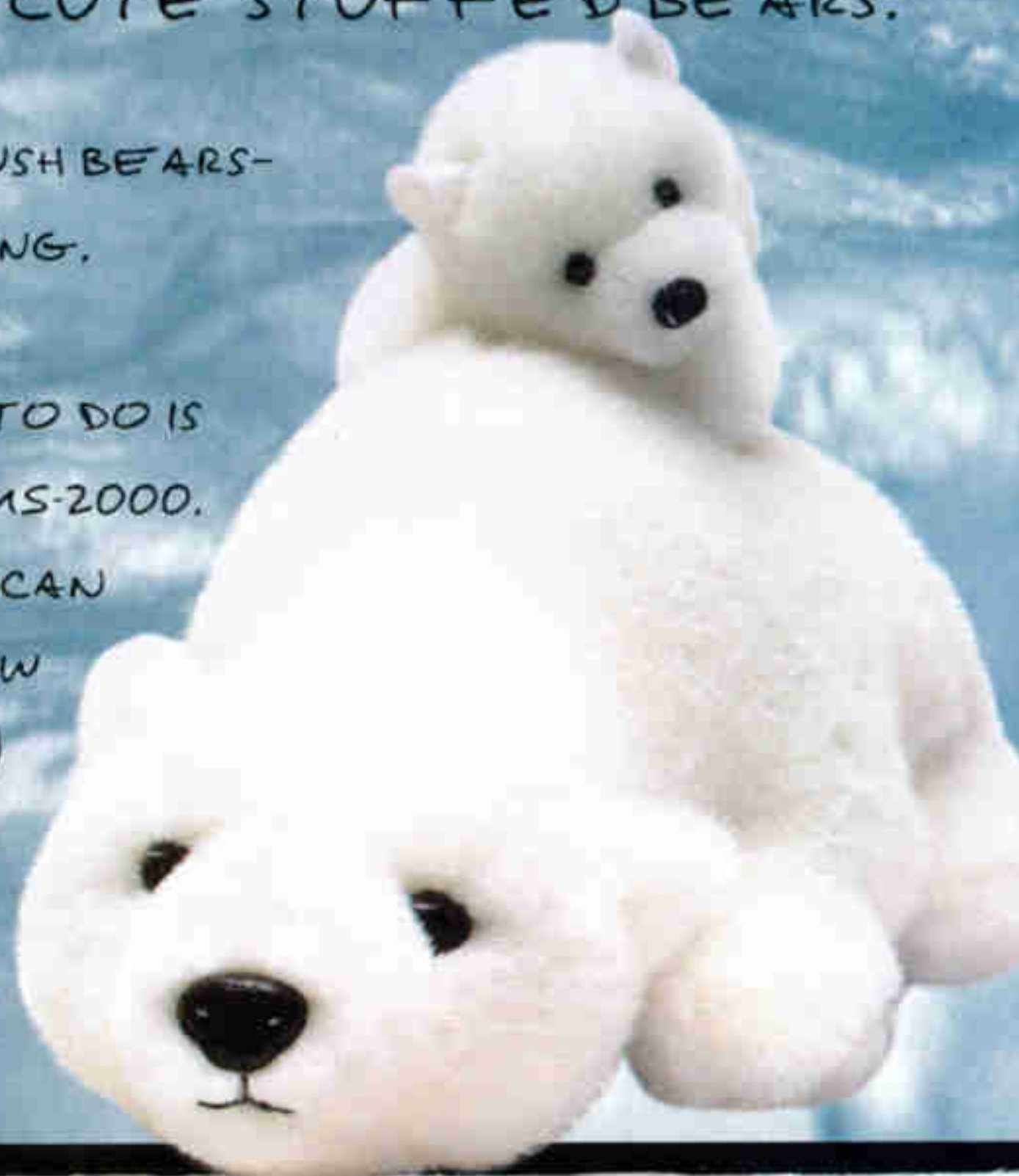
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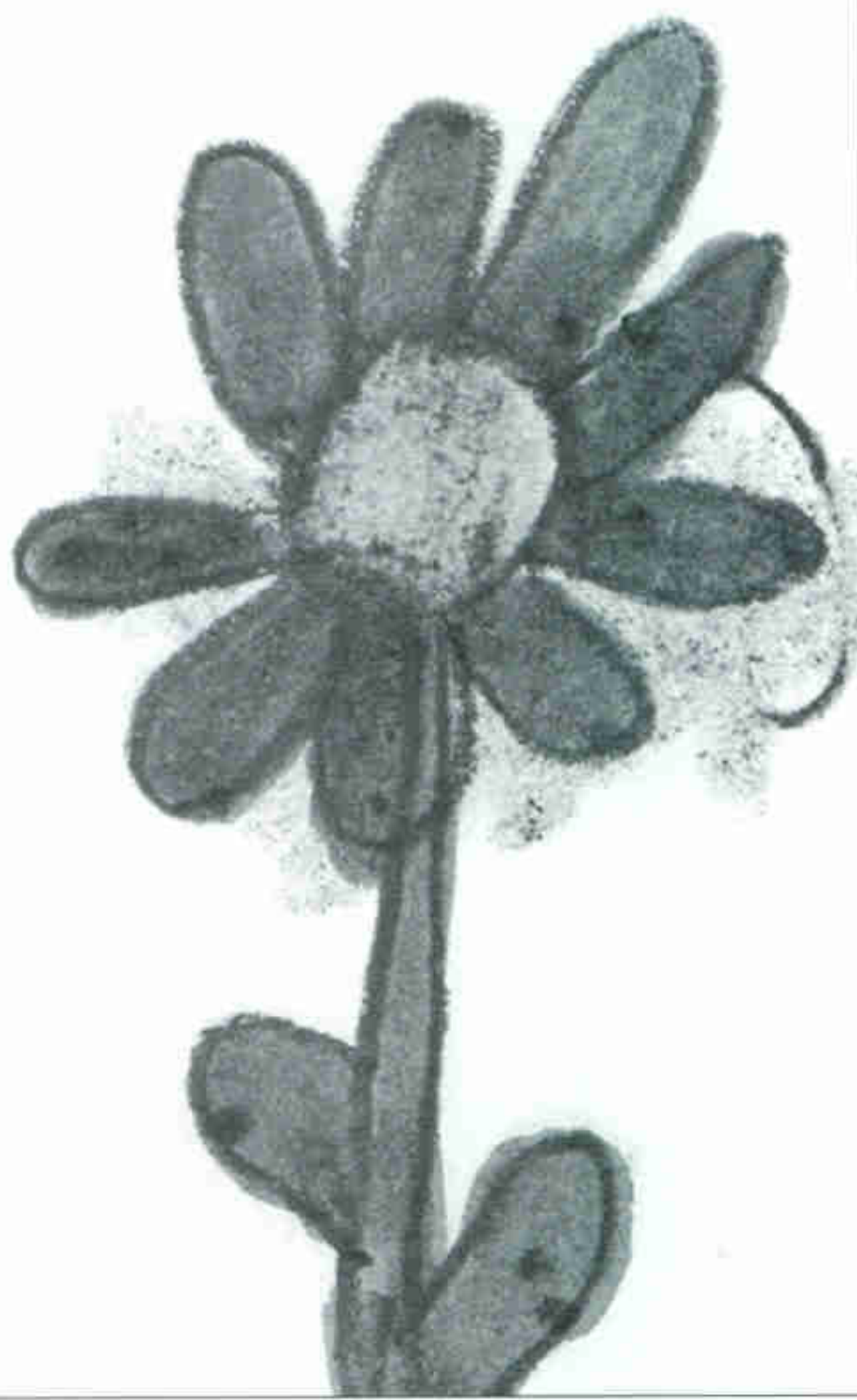
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The defeat at Isandlwana took place near Rorke's Drift, named after Irish settler James Rorke. My great-grandfather, another James Rorke, was with the 94th Connaught Rangers, an Irish regiment that later helped defeat the Zulus at Ulundi. He lived with his demons until he died in 1906.

CHRISTOPHER ROURKE
Providence, Rhode Island

Your article couldn't be more up-to-date. Before I had finished reading it, I got the message that a friend of mine, a farmer, had been killed at his home not far

WRITE TO FORUM

National Geographic Magazine, PO Box 98198, Washington, DC 20090-8198, or by fax to 202-828-5460, or via the Internet to ngsforum@nationalgeographic.com. Include name, address, and daytime telephone. Letters may be edited for clarity and space.

from Isandlwana. Two boys came asking for water. As he turned to go inside for the water, they shot two bullets in his neck. His wife was forced at gunpoint to show all their valuables. The boys stole them all and locked her up in a room. She escaped through a window and managed to reach the nearby kraal.

NILS KRISTIAN HOEIMYR
Stavanger, Norway

Regarding the quote on page 37, I can assure you that the number of cars hijacked from black people far exceeds that hijacked from whites. Crime is color-blind and the majority of victims in South Africa are black.

LEONARD R. SEELIG
Western Cape, South Africa

This quote comes from one group of men in one part of South Africa and is not meant as a comment on the situation nationwide.

Big Sur

Your article stated that the Esselen and Salinan peoples of the Big Sur region "vanished" after contact with Europeans. Currently there are several Salinan and Esselen groups petitioning to have their tribal status affirmed by the federal government. The descendants of these tribes would be surprised to hear that they died out several hundred years ago.

MARK EDWIN MILLER
Tucson, Arizona

I found it disconcerting that the Big Sur article opened with romantic imagery of two of California's peskiest introduced plants—pampas grass and eucalyptus. Though they may be pleasing to the eye, these two species are not part of Big Sur's natural heritage.

KAREN WIKLER
Madison, Wisconsin



Wired World

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Sponsor reserves the right, in its sole discretion, to void any and all entries of an entrant whom Sponsor believes has attempted to tamper with or impair the administration, security, fairness or proper play of this Sweepstakes. **Grand Prize:** \$250,000, which winner may use towards the purchase of his/her "A Home for the Holidays", awarded as a one-time payment of \$250,000 in the form of a check (value=\$250,000). **Judging:** Grand Prize winner will be selected in a random drawing from among all eligible entries received on/about 1/16/01 by Project Support Team, Inc., an independent judging organization whose decisions will be final and binding in all matters relating to this Sweepstakes. Winner will be notified by telephone and/or mail on or about 1/18/01. Prize will be awarded to the primary (as determined by the MasterCard member financial institution's account records) account holder named on the account accessed by the MasterCard card used to make the entry or referenced on the on-line entry or mail-in entry. In the event a winning account selected is a corporate MasterCard card account, prize will be awarded to the individual named on the MasterCard card that is used to transact the winning entry (as determined by the MasterCard member financial institution's account records) and, if awarding of prize is in conflict with corporate written policy, prize will be forfeited and an alternate winner will be selected. Odds of winning will depend on the number of eligible entries received. **Miscellaneous:** No transfer, assignment or substitution of prize, except by Sponsor due to prize unavailability, and then for a prize of equal or greater value. 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FORUM

Your article on Big Sur brought back fond memories of this truly magical, spirited place. As writer and Big Sur resident Henry Miller once wrote: It is "a region where one is always conscious of . . . eloquent silence. . . . This is the California that men dreamed of years ago . . . the face of the earth as the Creator intended it to look."

JAMES E. DELEHANTY
Jeffersonville, Indiana

The Temples of Angkor

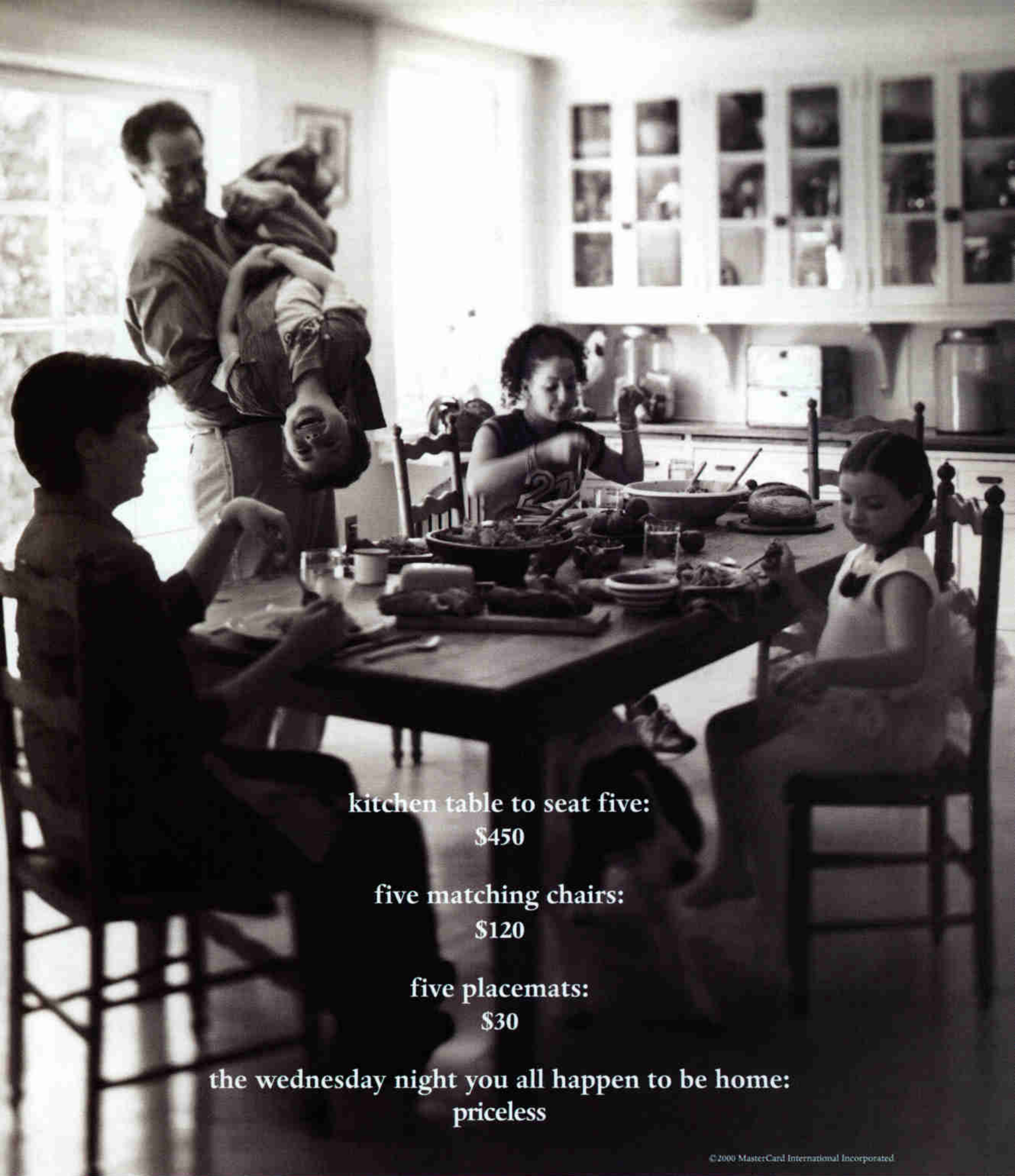
After extensive negotiations the Thai government returned the section of wall from Banteay Chhmar, and it is now on display in the National Museum in Phnom Penh. While it might still be dangerous and inconvenient to go to some areas along the border, that is no longer the case in the Angkor region. The APSARA authority has made great strides in the control and protection of the main cluster of monuments, including issuing passes to foreign visitors, hiring local people to check passes at the monuments and keep the grounds clean, and hiring guards to prevent people from harming the carvings. While much remains to be done, Cambodians should get credit for their progress.

JUDY LEDGERWOOD
*Northern Illinois University
DeKalb, Illinois*

As a documentary filmmaker who shot at the temples of Angkor in June 1999, I found your article accurately portrays a situation of widespread looting of artifacts, which is becoming more and more obvious to anyone who visits this unique and overwhelming site. Through articles such as yours, Cambodia's desperate battle to protect such a wonder has come to light. Now we should actively name and shame those who would profit from its demise.

DAVE MITCHELL
London, England

While serving with the International Labor Organization and the United Nations Development Program in Cambodia through 1993, I had the opportunity to visit Angkor Wat during a time when the country was emerging from a quarter century of horrors and genocide. Atop Angkor Wat I came upon the horror face-to-face. In front of me was a young girl about seven years old, begging.



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How was the city of Petra made?

Got a question? Just type it in at Ask.com.



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FORUM

One eye had been plucked out by her parents, according to my guide, to make her look pathetic and intimidate the onlookers into giving a sizable donation. The vision of this beautiful but intentionally disfigured young girl standing amid a marvel of accomplishment will remain with me forever.

JOHN B. MOULLETTE

Fort Garland, Colorado

Reading this article has given me a new respect for Hinduism. Born into a devout Hindu family in Bombay, I grew up watching my grandmother praying to deities whose names I can scarcely remember. I have now realized why my grandmother is so devoted to the religion. She cherishes Hinduism's rich history and ancient culture that has been preserved through centuries. Thank you for opening my eyes to my own religion.

KUNAL DESAI

Terre Haute, Indiana

Fungi

Seeing the picture of *huitlacoche* in your fungi article [page 66] made me want to pack my bags and travel to Mexico, my wife's native country, to eat freshly made *tacos de huitlacoche*. Although its common English name (corn smut) makes it sound unappetizing, I invite the curious to explore its earthy taste in any of the many dishes in which it is served (crepes, molotes, quesadillas, spaghetti, etc.).

CARLOS A. RODRÍGUEZ-GARCÍA

Cidra, Puerto Rico

Earth Almanac

As the mother of three very active sons who are interested in anything that creeps, crawls, slithers, or flies, I often get close-up encounters with all kinds of critters. Some of the more unusual ones prompt a quick trip to the library for identification. This spring we were stumped by a salamander the boys had caught. Imagine our surprise when we found a picture of the critter in question in the August issue! Ours was a perfect twin of this threatened species, and in an area where it is not supposed to exist. All I can say is it was very fat and healthy and seemed to be doing just fine in the pine flatwoods of East Texas.

K. SMITH

Kountze, Texas



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BOTH BY TRACY L. BARBUTES

APHICA

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MARINE LIFE

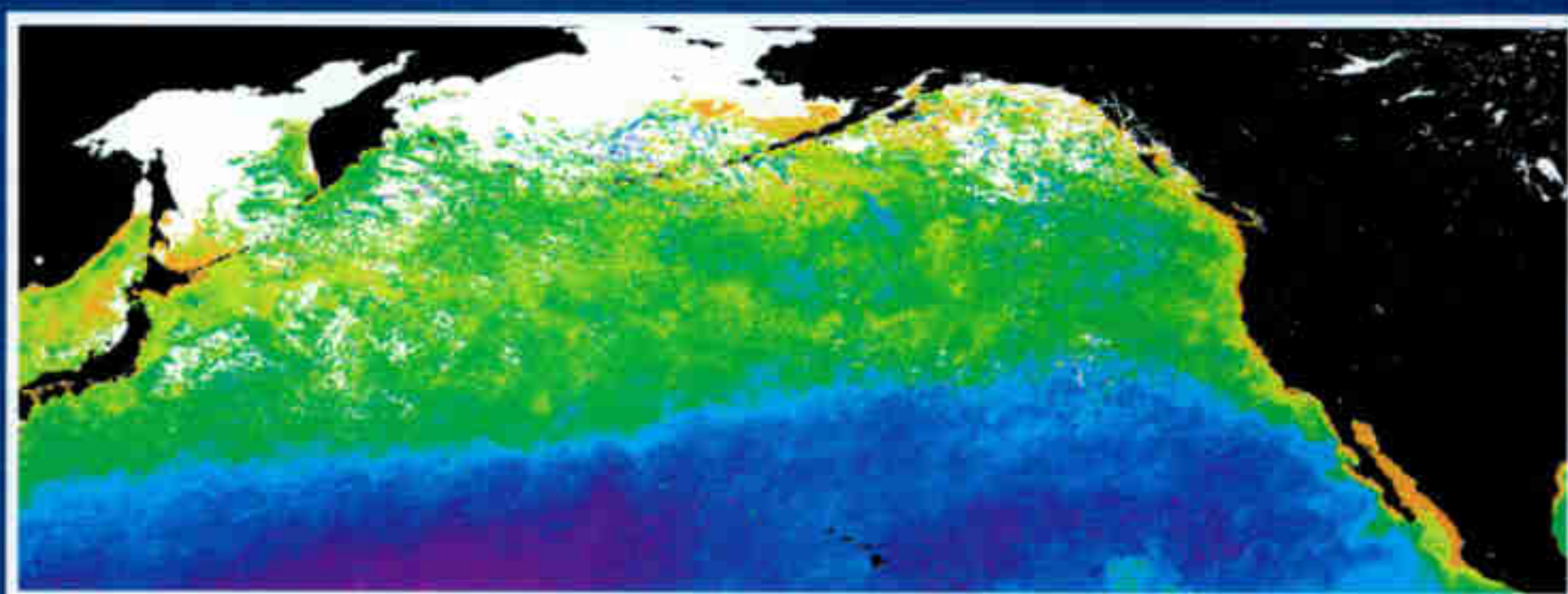
Loggerheads' Journey

Turtles feast along a Pacific plankton trail

Young mackerel escort a Pacific loggerhead turtle off Baja California.

Many of these 300-pound sea turtles are born on Yaku Shima in southern Japan, says Wallace J. Nichols, a California Academy of Sciences biologist. Over the next two to six years the turtles cross the Pacific along a line, says Jeffrey Polovina of the National Marine Fisheries Service, that runs between cool

water rich in plankton (green in the satellite image below) and warmer water low in plankton. As the cool water sinks beneath the warm, it traps buoyant creatures like jellyfish, a favorite food of turtles. Once the turtles reach Baja, they gorge on pelagic red crabs. Some loggerheads make the return journey. A few months ago Nichols tracked a female as she swam back toward Japan.



SEAWIFS IMAGE BY EVAN HOWELL, AMES RESEARCH CENTER, NASA (INSET); MIKE JOHNSON

ADVENTURE

One More Time Across the Ice

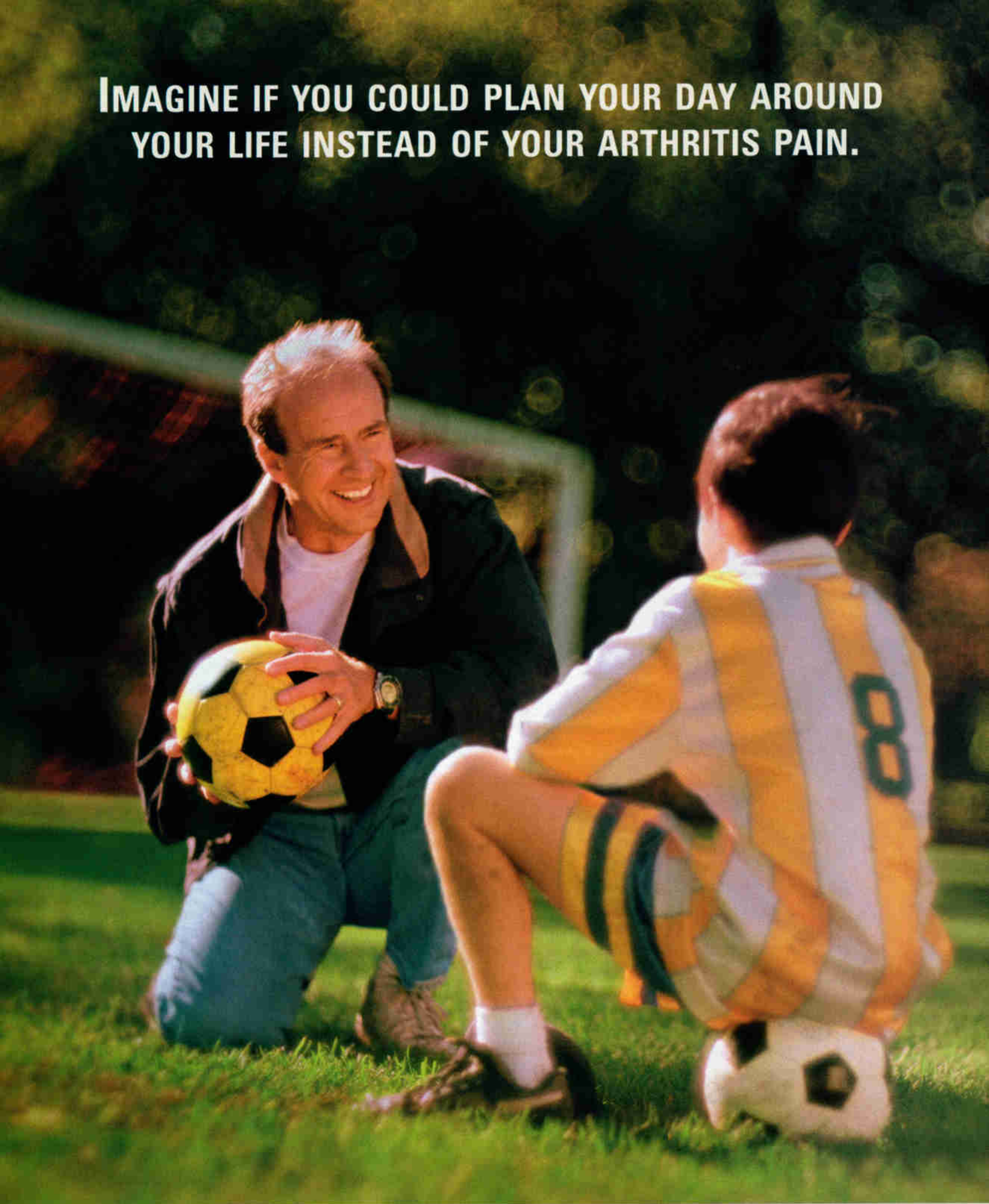
Veteran explorer retraces a legendary journey



In 1925 a group of Alaska dog mushers relayed antitoxin 700 miles across the tundra to save the lives of people sick with diphtheria. On February 28, 2000, at the age of 94, explorer Norman Vaughan (left, at left) set out to commemorate the heroic five-day trek from Nenana to Nome—only Vaughan traveled by snowmobile (far left) and took 17 days to complete the trip. Vaughan has a history of

cold-weather adventure, including running the grueling Iditarod sled dog race—which recalls the same lifesaving dash across Alaska—more than ten times. In 1927 the Massachusetts native dropped out of Harvard and joined Adm. Richard E. Byrd's Antarctic expedition. Byrd even named a mountain after the young dog handler. Mount Vaughan was never climbed until Vaughan did it himself in 1994 at the age of 88. He intends to scale the 10,302-foot peak again for his hundredth birthday and sip his first ever taste of champagne at the summit. It's always good to try something new.

**IMAGINE IF YOU COULD PLAN YOUR DAY AROUND
YOUR LIFE INSTEAD OF YOUR ARTHRITIS PAIN.**



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VIOXX IS HERE. 24-HOUR RELIEF FOR THE MOST COMMON TYPE OF ARTHRITIS PAIN, OSTEOARTHRITIS.

It isn't about winning a marathon. Or making you feel like a kid again. It's about controlling the pain that keeps you from doing everyday things. And VIOXX may help. VIOXX is a prescription medicine for osteoarthritis, the most common type of arthritis.

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TAKE WITH OR WITHOUT FOOD.

VIOXX doesn't need to be taken with food. So, you don't have to worry about scheduling VIOXX around meals.

IMPORTANT INFORMATION ABOUT VIOXX.

In rare cases, serious stomach problems, such as bleeding, can occur without warning. People with allergic reactions, such as asthma, to aspirin or other arthritis medicines should not take VIOXX.

Tell your doctor if you have liver or kidney problems, or are pregnant. Also, VIOXX should not be used by women in late pregnancy.

VIOXX has been extensively studied in large clinical trials. Commonly reported side effects included upper respiratory infection, diarrhea, nausea and high blood pressure. Report any unusual symptoms to your doctor.

ASK YOUR DOCTOR OR HEALTHCARE PROFESSIONAL ABOUT VIOXX.

Call 1-800-853-1516 for more information, or visit www.vioxx.com. Please see important additional information on the next page.

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**Patient Information about
VIOXX® (rofecoxib tablets and oral suspension)
VIOXX® (pronounced "VI-ox")
for Osteoarthritis and Pain
Generic name: rofecoxib ("ro-fa-COX-ib")**

You should read this information before you start taking VIOXX®. Also, read the leaflet each time you refill your prescription, in case any information has changed. This leaflet provides only a summary of certain information about VIOXX. Your doctor or pharmacist can give you an additional leaflet that is written for health professionals that contains more complete information. This leaflet does not take the place of careful discussions with your doctor. You and your doctor should discuss VIOXX when you start taking your medicine and at regular checkups.

What is VIOXX?

VIOXX is a nonsteroidal anti-inflammatory drug (NSAID) that is used to reduce pain and inflammation (swelling and soreness). VIOXX is available as a tablet or a liquid that you take by mouth.

VIOXX is a medicine for:

- relief of osteoarthritis (the arthritis caused by age-related "wear and tear" on bones and joints)
- management of acute pain in adults (like the short-term pain you can get after a dental or surgical operation)
- treatment of menstrual pain (pain during women's monthly periods).

Who should not take VIOXX?

Do not take VIOXX if you:

- have had an allergic reaction such as asthma attacks, hives, or swelling of the throat and face to aspirin or other NSAIDs (for example, ibuprofen and naproxen).
- have had an allergic reaction to rofecoxib, which is the active ingredient of VIOXX, or to any of its inactive ingredients. (See Inactive Ingredients at the end of this leaflet.)

What should I tell my doctor before and during treatment with VIOXX?

Tell your doctor if you are:

- pregnant or plan to become pregnant. VIOXX should not be used in late pregnancy because it may harm the fetus.
- breast-feeding or plan to breast-feed. It is not known whether VIOXX is passed through to human breast milk and what its effects could be on a nursing child.

Tell your doctor if you have:

- kidney disease
- liver disease
- heart failure
- high blood pressure
- had an allergic reaction to aspirin or other NSAIDs
- had a serious stomach problem in the past.

Tell your doctor about:

- any other medical problems or allergies you have now or have had.
- all medicines that you are taking or plan to take, even those you can get without a prescription.

Tell your doctor if you develop:

- ulcer or bleeding symptoms (for instance, stomach burning or black stools, which are signs of possible stomach bleeding).
- unexplained weight gain or swelling of the feet and/or legs.
- skin rash or allergic reactions. If you have a severe allergic reaction, get medical help right away.

How should I take VIOXX?

VIOXX should be taken once a day. Your doctor will decide what dose of VIOXX you should take and how long you should take it. You may take VIOXX with or without food.

Can I take VIOXX with other medicines?

Tell your doctor about all of the other medicines you are taking or plan to take while you are on VIOXX, even other medicines that you can get without a prescription. Your doctor may want to check that your medicines are working properly together if you are taking other medicines such as:

- methotrexate (a medicine used to suppress the immune system)
- warfarin (a blood thinner)
- rifampin (an antibiotic)
- ACE inhibitors (medicines used for high blood pressure and heart failure).

What are the possible side effects of VIOXX?

Serious but rare side effects that have been reported in patients taking VIOXX and/or related medicines have included:

- Serious stomach problems, such as stomach and intestinal bleeding, can occur with or without warning symptoms. These problems, if severe, could lead to hospitalization or death. Although this happens rarely, you should watch for signs that you may have this serious side effect and tell your doctor right away.
- Serious allergic reactions including swelling of the face, lips, tongue, and/or throat which may cause difficulty breathing or swallowing occur rarely but may require treatment right away.
- Serious kidney problems occur rarely, including acute kidney failure and worsening of chronic kidney failure.
- Severe liver problems occur rarely in patients taking NSAIDs. Tell your doctor if you develop symptoms of liver problems. These include nausea, tiredness, itching, tenderness in the right upper abdomen, and flu-like symptoms.

In addition, the following side effects have been reported:

hallucinations, unusual headache with stiff neck (aseptic meningitis).

More common, but less serious side effects reported with VIOXX have included the following:

Upper and/or lower respiratory infection and/or inflammation

Headache

Dizziness

Diarrhea

Nausea and/or vomiting

Heartburn, stomach pain and upset

Swelling of the legs and/or feet

High blood pressure

Back pain

Tiredness

Urinary tract infection.

These side effects were reported in at least 2% of osteoarthritis patients receiving daily doses of VIOXX 12.5 mg to 25 mg in clinical studies.

The side effects described above do not include all of the side effects reported with VIOXX. Do not rely on this leaflet alone for information about side effects. Your doctor or pharmacist can discuss with you a more complete list of side effects. Any time you have a medical problem you think may be related to VIOXX, talk to your doctor.

What else can I do to help manage my osteoarthritis pain?

Talk to your doctor about:

- Exercise
- Controlling your weight
- Hot and cold treatments
- Using support devices.

What else should I know about VIOXX?

This leaflet provides a summary of certain information about VIOXX. If you have any questions or concerns about VIOXX, osteoarthritis or pain, talk to your health professional. Your pharmacist can give you an additional leaflet that is written for health professionals.

Do not share VIOXX with anyone else; it was prescribed only for you. It should be taken only for the condition for which it was prescribed.

Keep VIOXX and all medicines out of the reach of children.

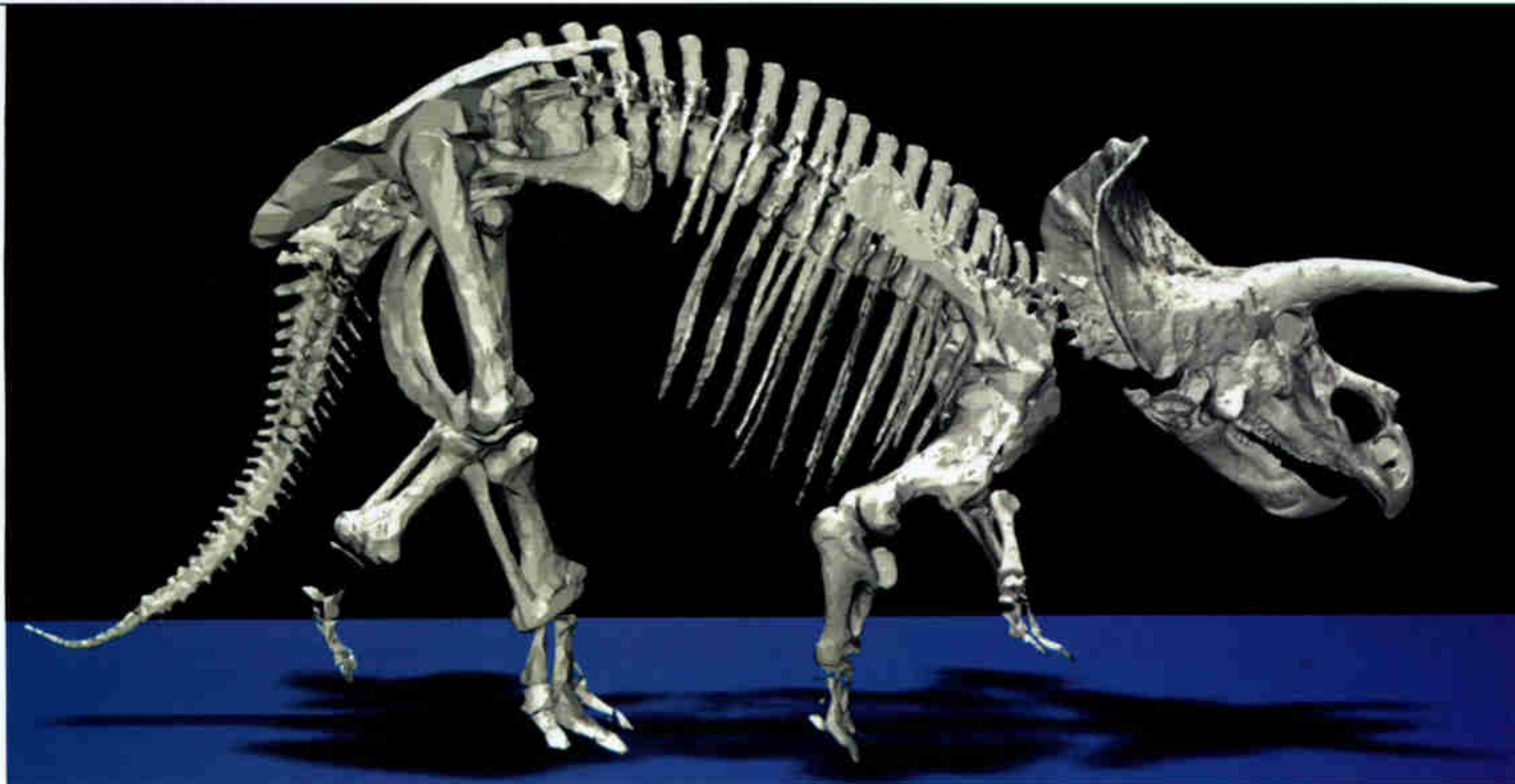
Inactive Ingredients:

Oral suspension: citric acid (monohydrate), sodium citrate (dihydrate), sorbitol solution, strawberry flavor, xanthan gum, sodium methylparaben, sodium propylparaben.

Tablets: croscarmellose sodium, hydroxypropyl cellulose, lactose, magnesium stearate, microcrystalline cellulose, and yellow ferric oxide.

Issued March 2000

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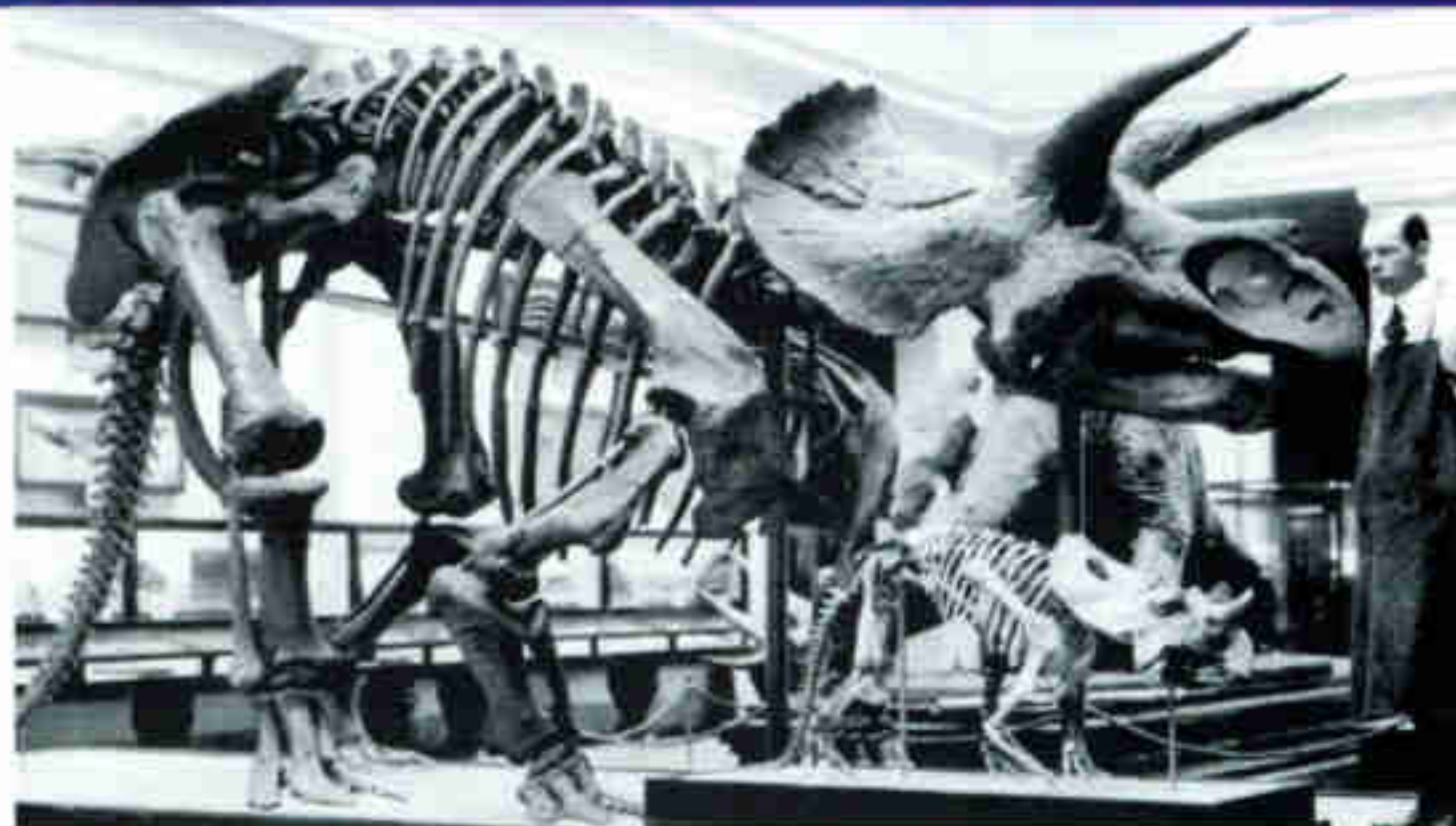


PALEONTOLOGY

New and Improved

Trying again on a famous triceratops

When you imagine a triceratops, the one that comes to mind is probably the Smithsonian's "Mr. T" (right), the first ever exhibited in the world. Assembled in 1905 from the bones of 14 different animals, Mr. T's head is too small for his body, and his feet are actually those of a duck-billed dinosaur. Now scientists at the Smithsonian's National Museum



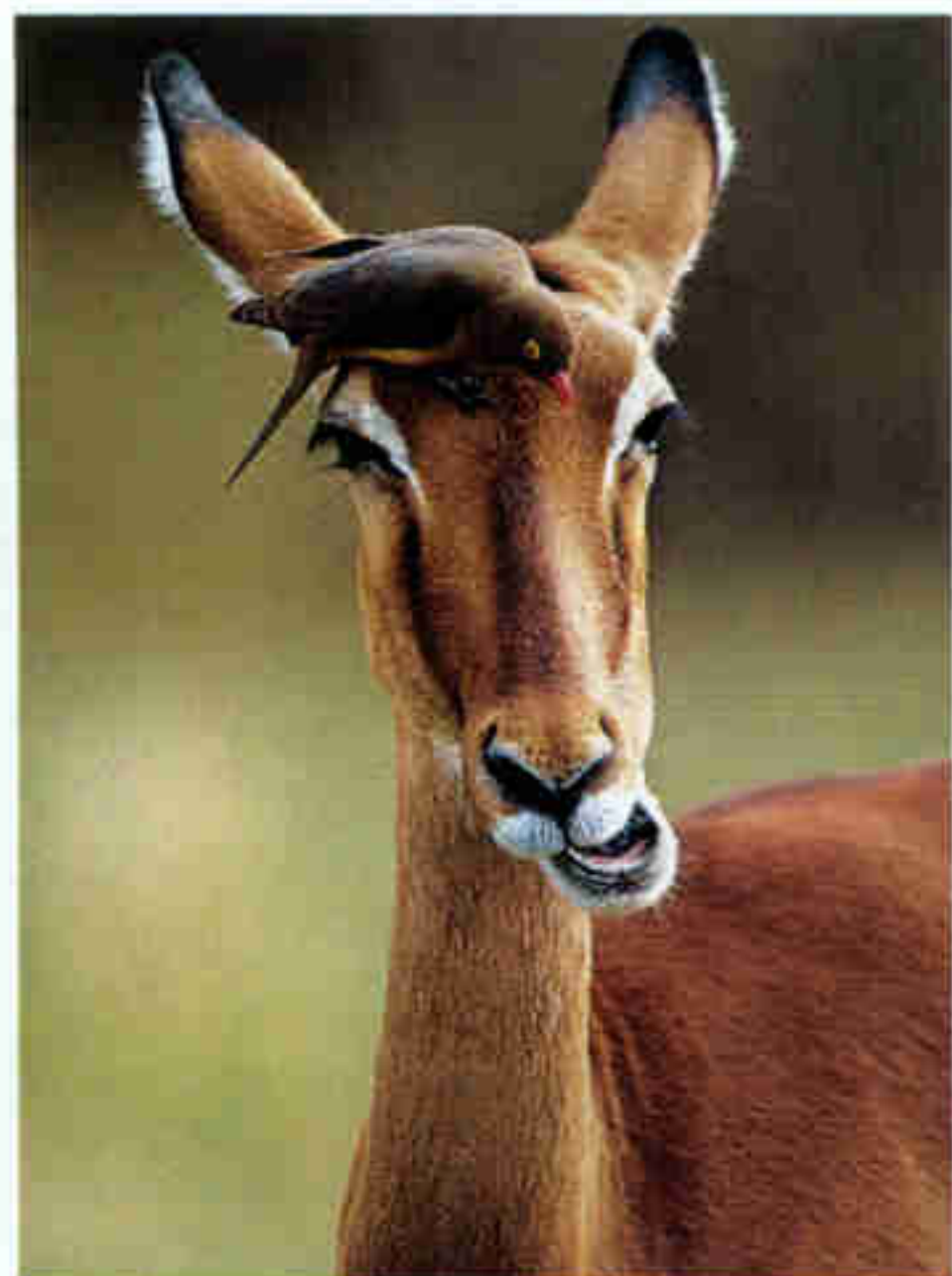
BOTH FROM NATIONAL MUSEUM OF NATURAL HISTORY, SMITHSONIAN INSTITUTION

of Natural History are refurbishing the triceratops, using computer imagery (top) and the most up-to-date research to construct a skeleton cast with correct body parts, posture, and proportions.

NATURE

Different Pecking Order

Not just scavengers, oxpeckers are out for blood



ANUP SHAH, BBC

Africa's red-billed oxpeckers had long been thought to aid mammals like this impala by picking ticks off their skin—an example of mutualism. But British zoologist Paul Weeks kept oxpeckers away from a group of oxen and found no change in the number of ticks. On other oxen, oxpeckers picked at existing wounds, delaying the healing time.

"There is strong evidence that blood is the birds' favored food," writes Weeks—and parasitism their game.

ALMANAC

December

Snowbirds of the sea, humpback whales head for warm waters to mate or give birth to calves conceived the previous year. As winter chills their feeding grounds, humpbacks off Alaska swim to Hawaii, while those in the North Atlantic head to the Caribbean. Others shift from the Antarctic to Oceania and tropical waters off South America, Africa, and Australia.



ART BY MATTHEW FREY

WISH UPON A STAR



PROFITS & PRINCIPLES.

The sun holds such bright promise as
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HISTORY

Leap of Faith

Leonardo da Vinci's parachute finally flies

“Experts said it wouldn’t work,” says Adrian Nicholas of his June jump over South Africa (right) in a canvas parachute designed to Leonardo da Vinci’s 15th-century specifications (inset sketch). A modern parachute allowed Nicholas to disengage from the 200-pound wooden framework as he neared the ground. A helicopter circled to help photograph the descent, “which we hope would have made da Vinci smile,” says Nicholas. “He drew plans for rotary flight too.”



HEATHCLIFF O'MALLEY; ART INSET © BALDWIN H. AND KATHRYN C. WARD, CORBIS



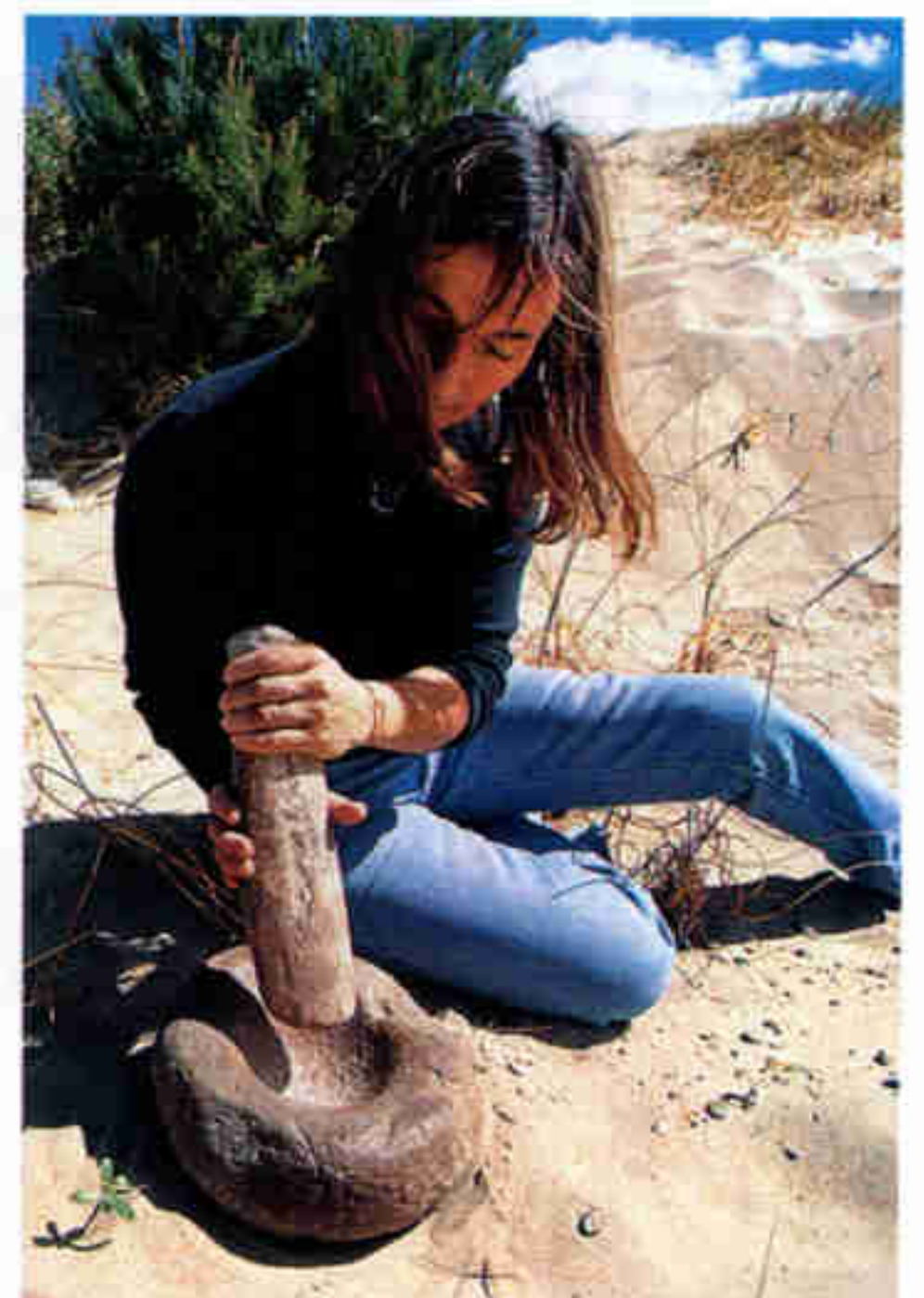
■ NGS RESEARCH GRANT

Early Patagonians

A little-studied region of Argentina's Península Valdés may have been occupied as early as 3035 B.C., according to Committee for Research and Exploration grantee Julieta Gómez Otero (above right) of Argentina's Centro Nacional Patagónico. Her



three-year project has shed new light on the lives—and deaths (above)—of the north-central Patagonian coast's earliest occupants. They were far-ranging hunter-gatherers, she says, who supplemented a land-based food supply with shellfish. Gómez Otero has discovered tools such as arrowheads. Some were made from rock that originated far from the study site, indicating that these people engaged in extensive trade.



JUAN CARLOS AGUERREBERE (ABOVE); JULIETA GÓMEZ OTERO

TAKE FIVE

U.S. airports that boarded most passengers last year:

Atlanta Hartsfield	39,121,444
Chicago O'Hare	35,981,457
Los Angeles	32,298,944
Dallas/Fort Worth	29,965,027
San Francisco	19,850,868

SOURCE: AIRPORTS COUNCIL INTERNATIONAL



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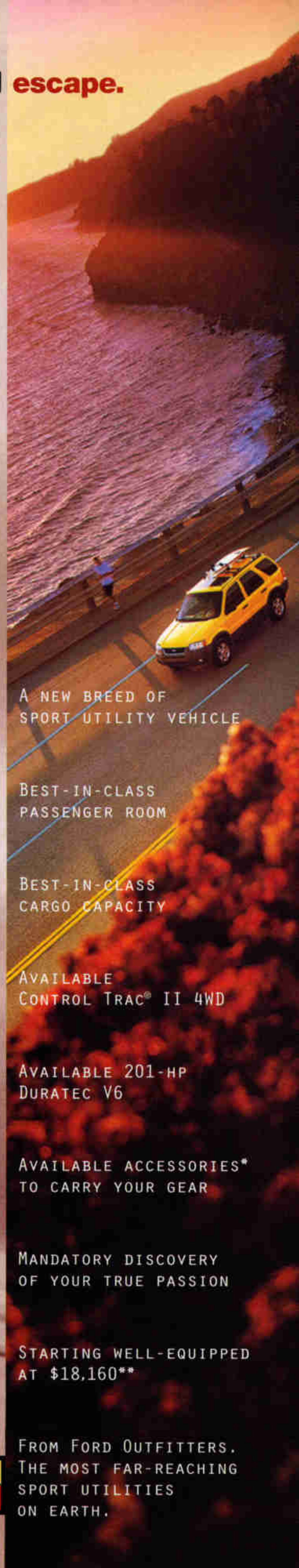
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Behind the SCENES

AT THE NATIONAL GEOGRAPHIC SOCIETY



KIKO FERRITE (BOTH)

EXPLORER-IN-RESIDENCE

Paul Sereno—paleontologist, University of Chicago professor, and eminent bone digger—has conducted expeditions on three continents since 1988 in search of the lost dinosaur world. Sereno and his team have discovered fossils of many previously unknown creatures, including *Suchomimus*, a 36-foot-long fish-eating predator, and *Jobaria*, a 60-foot-tall herbivore, both excavated in the remote southern Sahara.



GEORGE STEINMETZ

On TV, in the Stands

Staffers visit Brazil for a new edition's launch

When the GEOGRAPHIC's Portuguese-language edition made its debut in Brazil last spring, photographers Chris Johns (above, at left) and David Alan Harvey, center, ran workshops for local shooters who, Chris says, "were

anxious to know how we make the pictures we do." They also introduced the magazine on TV shows such as the one hosted by Jô Soares, at right. Chris calls him "a very funny guy, the Johnny Carson of Brazil."

Also in Brazil to train local staff was Robin Perry (left), our managing editor for international editions. An avid soccer fan, she attended the showdown between Corinthians and Palmeiras during the South American championships. "The crowd's energy level was something I've never experienced," says Robin, who bought a jester's hat in Corinthians' colors. It must have helped: They won.



100 YEARS AGO



December 1900

"Physical geography introduced and developed with care . . . can do more than any other science that has a place in the elementary school curriculum in giving a training for intelligent citizenship."

From "The Teaching of Physical Geography in Elementary Schools," by Richard E. Dodge

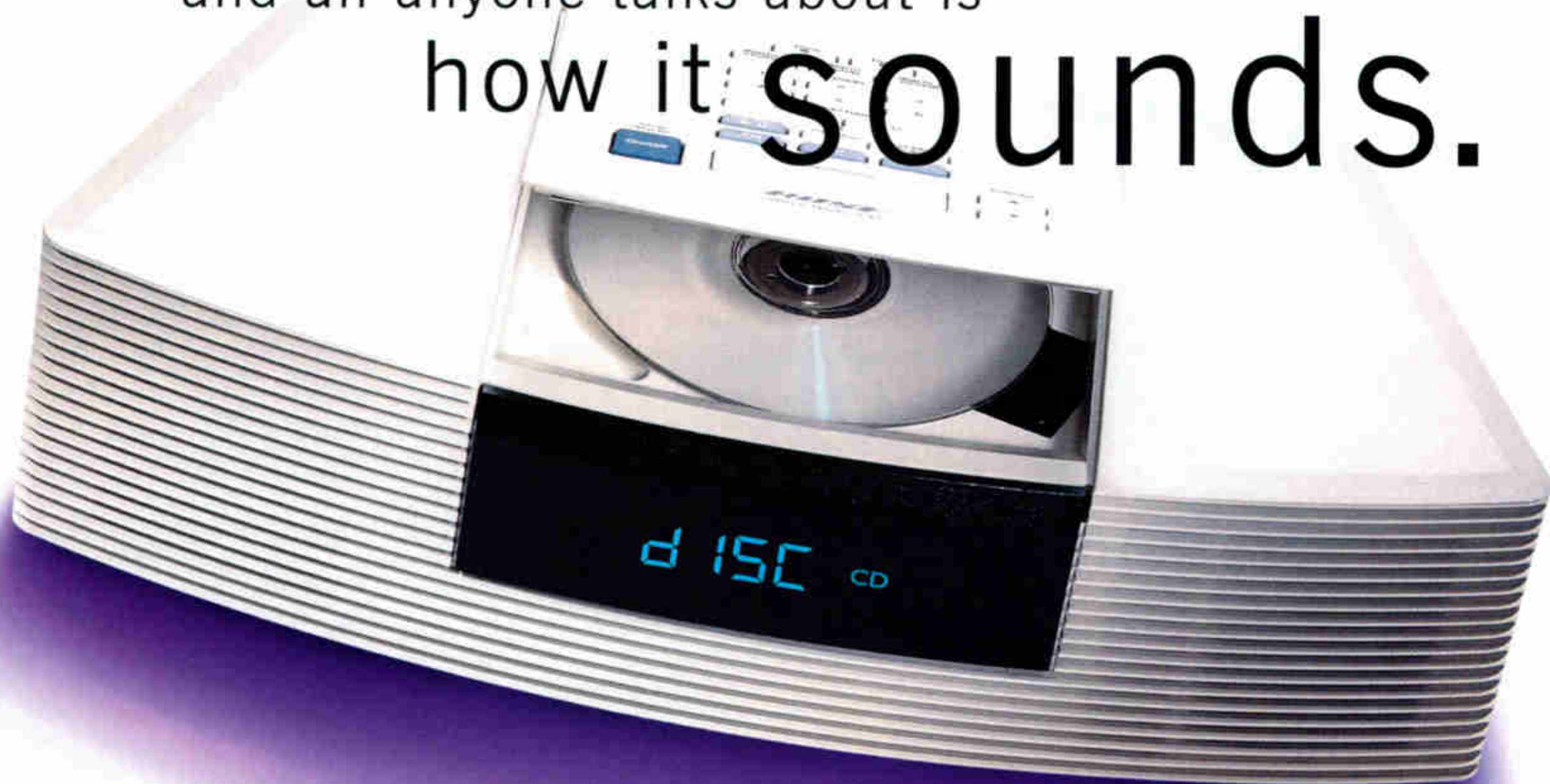
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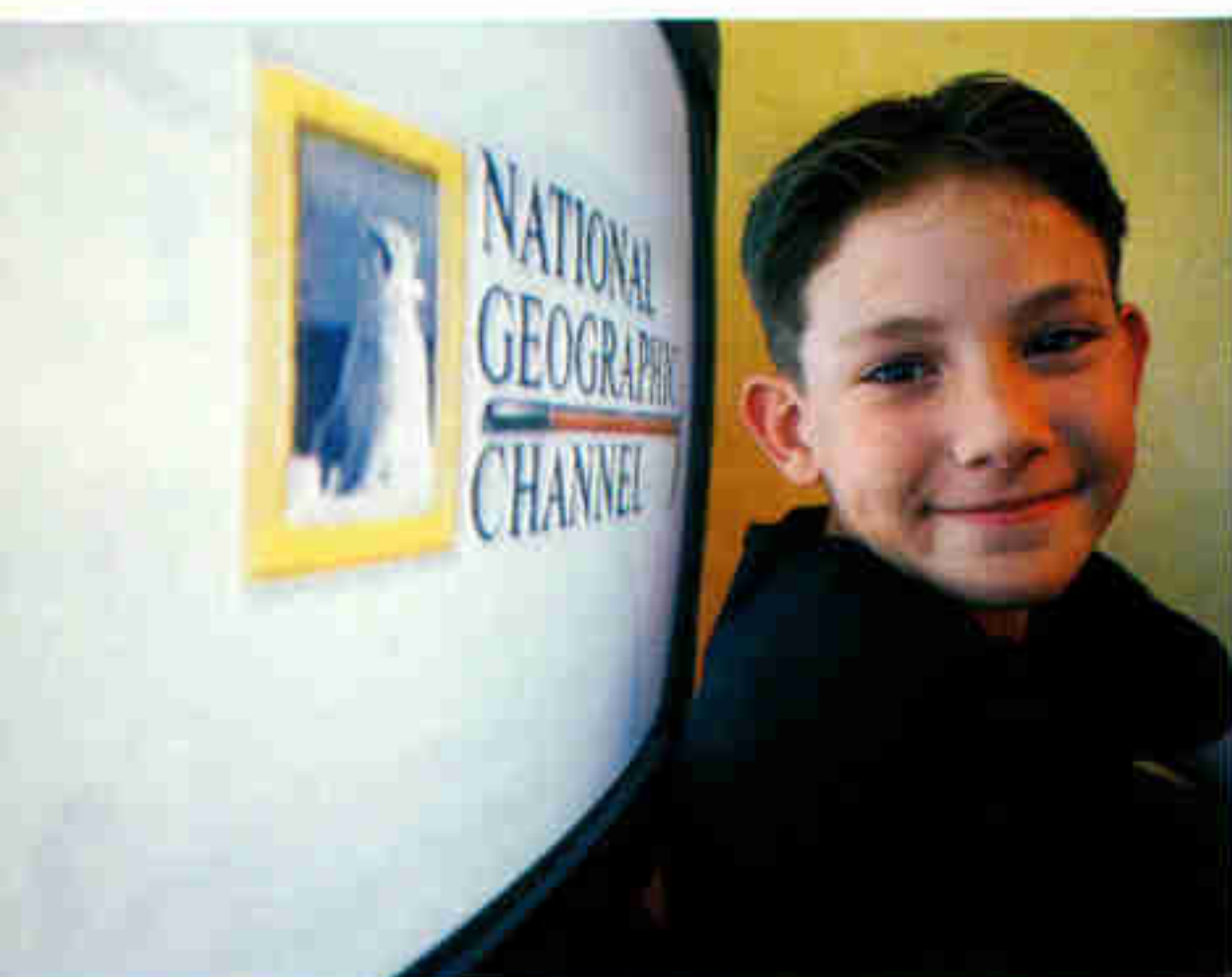


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Bring Back My Channel!

A Dutch youth takes action and triumphs

Micky Klein loves to watch documentaries about animals. When the cable TV system in his Netherlands hometown of Waalwijk announced in February that it was dropping the National Geographic Channel—his prime source of such films—the 11-year-old got angry. Micky (below) launched a door-to-door



MENNO BOERMANS

drive with petitions urging the station to restore the channel. He garnered an impressive 1,300 signatures in the city of 45,000 residents, so the cable system relented. Beginning this month, Micky will be able to do his animal-watching once again.

FOR MORE INFORMATION

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PENNY DE LOS SANTOS

Ancient Redwoods Preserved

Terry Garcia, now with NGS, was on the front lines

A decade of turmoil and protest came to an end last March when northern California's Headwaters Forest—then the largest stand of old-growth redwoods still in private ownership—was transferred from the Pacific Lumber Company to the public domain. Hiking through the new Headwaters Forest Reserve soon after the transfer, Terry Garcia, the Society's head of mission programs, enjoyed the fruits of his labors. Before joining the Society in

November 1999, Terry was an assistant secretary of commerce and served as a lead negotiator when the bargaining to acquire the forest heated up in 1998. The next year, right up against the March 1 deadline set by Congress, an agreement was reached for the federal and state governments to buy the 7,500-acre Headwaters grove and nearby tracts for nearly half a billion dollars. "We concluded the negotiations only minutes before the midnight deadline," Terry recalls.

POLAR BEAR POSTER



A limited-edition print of Norbert Rosing's polar bears (page 39) is available for \$39.95 plus \$6.50 for postage and handling (\$9.50 for international orders). Please add appropriate sales tax for orders sent to CA, DC, FL, KY, MD, MI, PA, and Canada. We will produce only as many 24-by-30-inch posters as we receive orders for by February 1. Each print will be hand-numbered and embossed with the Society seal. Shipping is scheduled for April 2001.

Call toll free: 1-888-647-7301 (Outside the U.S. and Canada call 1-515-352-3363)

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For people with type 2 diabetes

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Avandia, along with diet and exercise, helps improve blood sugar control. It may be prescribed alone, with Glucophage[®] (metformin HCl tablets), or with sulfonylureas, such as Amaryl[®] (glimepiride tablets) and Glucotrol XL[®] (glipizide).

In studies, the most common side effects included cold-like symptoms and headache. A small percentage of people experienced anemia and/or mild to moderate swelling of their legs or ankles. If you experience these or other symptoms, talk to your doctor.

I am stronger than diabetes

When taking *Avandia* with a sulfonylurea you may be at risk for low blood sugar. Ask your doctor whether you need to adjust your sulfonylurea dosage.

While taking *Avandia*, follow your doctor's guidelines for periodic liver monitoring. If you experience nausea, vomiting, stomach pain, tiredness, anorexia, dark urine or yellowing of the skin, talk to your doctor immediately. Also, talk to your doctor if you experience shortness of breath or an unusually rapid increase in weight. Tell your doctor if you have a history of congestive heart failure or edema. Please see important patient information on the following page.

If you are a premenopausal woman who is not ovulating, you should know that *Avandia* therapy may result in resumption of ovulation, which may increase your chances of becoming pregnant. Therefore, you may need to consider birth control options. Talk to your doctor before taking *Avandia* if you are nursing, pregnant or thinking about becoming pregnant.

For improved blood sugar control, follow the diet, exercise, weight-loss and medication plan recommended by your doctor and test your blood sugar regularly.

If you have type 2 diabetes, talk to your doctor.

Or for more information, call
1-800-AVANDIA. www.avandia.com

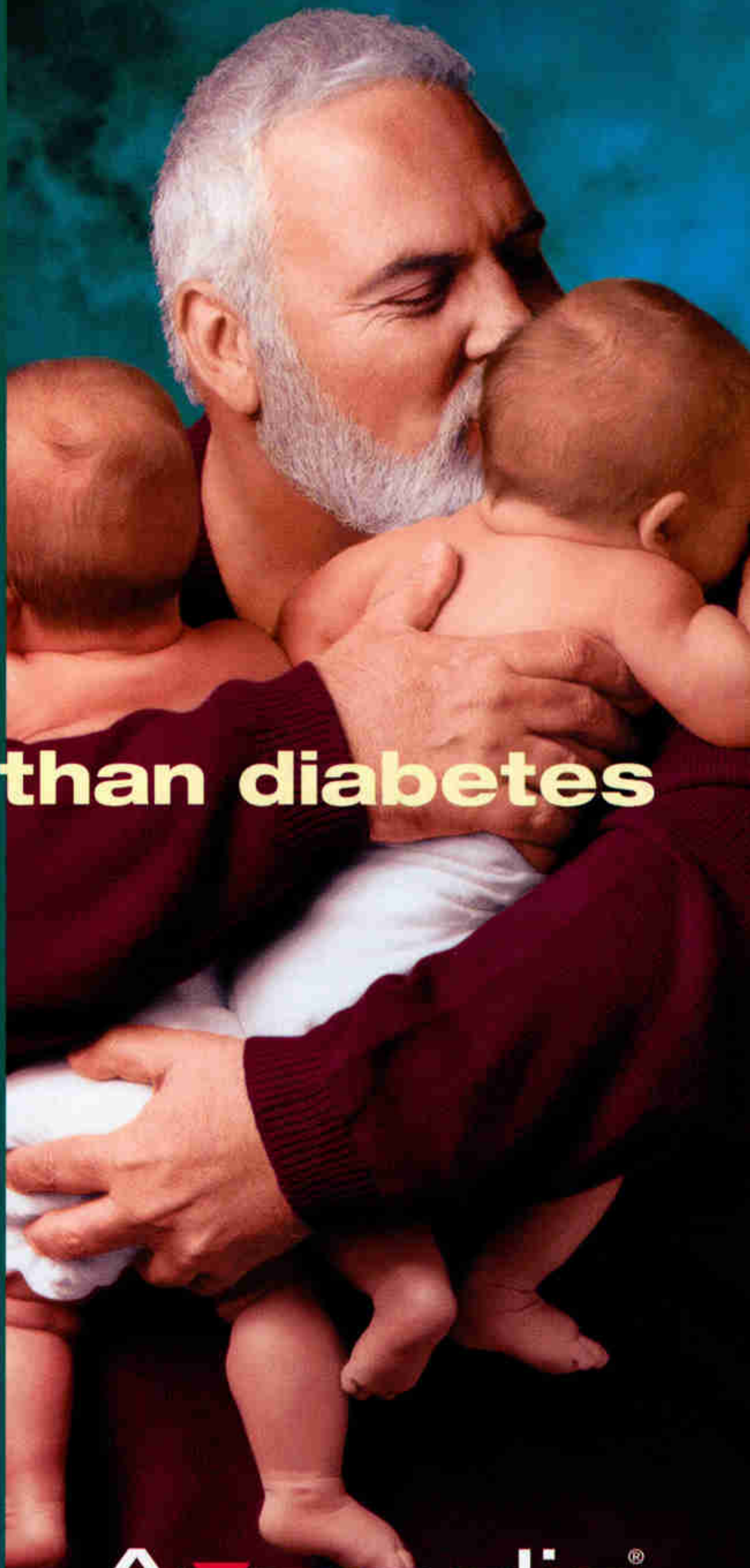
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rosiglitazone maleate

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Patient Information About AVANDIA® (rosiglitazone maleate) Tablets 2 mg, 4 mg, and 8 mg

What is Avandia?

Avandia is one product in a new class of prescription drugs called thiazolidinediones (thigh-a-zoe-lid-eeen-die-owns). It is used to treat type 2 diabetes by helping the body use the insulin that it is already making. *Avandia* comes as pills that can be taken either once a day or twice a day to help improve blood sugar levels.

How does Avandia treat type 2 diabetes?

If you have type 2 diabetes, your body still produces insulin but it is not able to fully use the insulin. Insulin is needed to allow sugar to be carried from the bloodstream into many cells of the body for energy. If insulin is not being used correctly, sugar does not enter the cells very well and builds up in the blood. If not controlled, the high blood sugar level can lead to serious medical problems, including kidney damage, blindness and amputation.

Avandia helps your body use insulin by making the cells more sensitive to insulin so that the sugar can enter the cell.

How quickly will Avandia begin to work?

Avandia begins to reduce blood sugar levels within 2 weeks. However, since *Avandia* works to address an important underlying cause of type 2 diabetes, insulin resistance, it may take up to 12 weeks to see the full effect. If you do not respond adequately to your starting dose of *Avandia*, your physician may increase your daily dose to improve your blood sugar control.

How should I take Avandia?

Your doctor may tell you to take *Avandia* once a day in the morning or twice a day in the morning and evening. It can be taken with or without meals. Food does not affect how *Avandia* works. To help you remember to take *Avandia*, you may want to take it at the same time every day.

What if I miss a dose?

If your doctor has prescribed Avandia for use once a day:

- As soon as you remember your missed dose, take one tablet anytime during the day.
- If you forget and go a whole day without taking a dose, don't try to make it up by adding another dose on the following day. Forget about the missed dose and simply follow your normal schedule.

If your doctor has prescribed Avandia for use twice a day:

- As soon as you remember the missed dose, take one tablet.
- Take the next dose at the normal time on the same day.
- Don't try to make up a missed dose from the day before.
- You should never take three doses on any single day in order to make up for a missed dose the day before.

Do I need to test my blood for sugar while using Avandia?

Yes, you should follow your doctor's instructions about your at-home testing schedule.

Does Avandia cure type 2 diabetes?

Currently there is no cure for diabetes. The only way to avoid the effects of the disease is to maintain good blood sugar control by following your doctor's advice for diet, exercise, weight control, and medication. *Avandia*, alone or in combination with other prescription drugs,

may improve these other efforts by helping your body make better use of the insulin it already produces.

Can I take Avandia with other medications?

Avandia has been taken safely by people using other medications, including other antidiabetic medications, birth control pills, warfarin (a blood thinner), Zantac® (ranitidine, an antiulcer product manufactured by Glaxo Wellcome Inc.), certain heart medications, and some cholesterol-lowering products. You should discuss with your doctor the most appropriate plan for you. If you are taking prescription or over-the-counter products for your diabetes or for conditions other than diabetes, be sure to tell your doctor. Sometimes a patient who is taking two antidiabetic medications each day can become irritable, lightheaded or excessively tired. Tell your doctor if this occurs; your blood sugar levels may be dropping too low, and the dose of your medication may need to be reduced.

What should I discuss with my doctor before taking Avandia?

You should talk to your doctor if you have a history of edema, liver problems or congestive heart failure, or if you are nursing, pregnant or thinking of becoming pregnant. If you are a premenopausal woman who is not ovulating, you should know that *Avandia* therapy may result in the resumption of ovulation, which may increase your chances of becoming pregnant. Therefore, you may need to consider birth control options.

What are the possible side effects of Avandia?

Avandia was generally well tolerated in clinical trials. The most common side effects reported by people taking *Avandia* were upper respiratory infection and headache. As with most other diabetes medications, you may experience an increase in weight (3 to 8 pounds). This often occurs with improved blood sugar control. *Avandia* may also cause edema and/or anemia. If you experience any swelling of your extremities (e.g., legs, ankles) or tiredness, notify your doctor. Talk to your doctor if you experience shortness of breath or unusually rapid increase in weight.

Who should not use Avandia?

The following people should not take *Avandia*: People with type 1 diabetes, people who experience yellowing of the skin with Rezulin® (troglitazone, Parke-Davis), people who are allergic to *Avandia* or any of its components and people with diabetic ketoacidosis.

Why are laboratory tests recommended?

Your doctor may conduct blood tests to measure your blood sugar control. In addition, your doctor may conduct liver enzyme tests. *Avandia* did not show signs of liver problems in studies. However, because a related drug (*Rezulin*) has been associated with such problems, and because *Avandia* has not been widely used, your doctor may recommend a blood test to monitor your liver before you start taking *Avandia*, every 2 months during the first year and periodically thereafter.

It is important that you call your doctor immediately if you experience nausea, vomiting, stomach pain, tiredness, anorexia, dark urine, or yellowing of the skin.

How should I store Avandia?

Avandia should be stored at room temperature in a childproof container out of the reach of children. Store *Avandia* in its original container.

DATE OF ISSUANCE MAY 2000

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-Helen Keller

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wants mobility and a
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including electricity.

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journey that will take
the world's expectations
of energy beyond what
anyone can see today.

beyond petroleum

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Webscapes

■ LAKE WOBEGON

Hear excerpts from the story (pages 86-109) in the inimitable voice of author Garrison Keillor. nationalgeographic.com/ngm/0012

■ POLAR BEARS

Our postcards of the Arctic omnivores (pages 30-39) are, well, cool. You'll find a special gift offer too at nationalgeographic.com/ngm/0012

■ SALEM WITCH-HUNT
Harry Potter's wizardry may be hip, but attitudes were starkly different in Puritan Massachusetts.

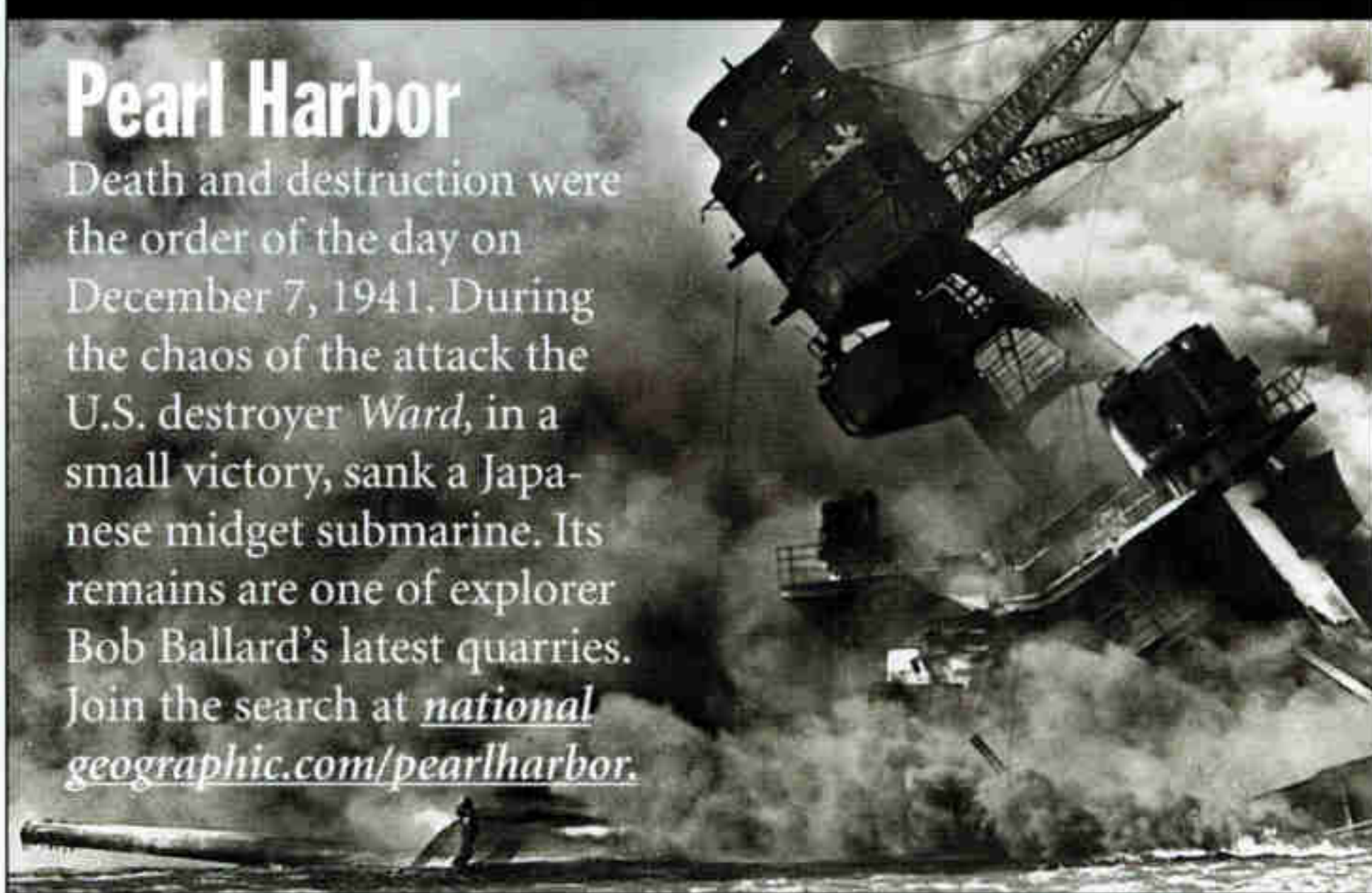
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■ KIDS

Do you like action figures with awesome powers? Watch a team of creative designers build the perfect predator—a cat. nationalgeographic.com/cats

Pearl Harbor

Death and destruction were the order of the day on December 7, 1941. During the chaos of the attack the U.S. destroyer *Ward*, in a small victory, sank a Japanese midget submarine. Its remains are one of explorer Bob Ballard's latest quarries. Join the search at nationalgeographic.com/pearlharbor.



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Sizing Up Snakes

We love them, we love them not

For the countless people who tremble at the sight of a western diamondback coiled to strike, there are others who thrill to the display. *Snakes in the U.S.A.* investigates what producer Leslie Schwerin calls "America's love-hate relationship" with the slithery reptiles. Focusing on human encounters with snakes, the film features an expert who treats snake phobias, tourists who seek out rattlesnakes in the New Mexico desert, and a New Yorker who rescues unwanted pet snakes.

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AskUs

THE ANSWER PLACE

Our Research Correspondence staff responds to questions from curious readers.

Q What is the land speed of an American alligator?

A University of Florida biologist Kent Vliet says that American alligators can run up to 11 miles an hour for short bursts, rarely more than 15 yards. In water they clock only about two miles an hour. Crocodiles on land can sprint more than 15 miles an hour.

Q Why is there an ozone hole over the South Pole when the industrialized nations are mainly in the Northern Hemisphere?

A Ozone-destroying chlorofluorocarbons (CFCs) are trapped in both polar regions by the polar vortex, a system of winds that circles each Pole. The cold temperatures exacerbate the chemical reaction in which CFCs destroy ozone. The South Pole's continental landmass makes for colder air and a stronger vortex—and much more ozone damage. But there is a small, growing ozone hole over the North Pole as well.

MORE INFORMATION

Send questions to Ask Us, National Geographic Magazine, PO Box 96095, Washington, DC 20090-6095 or via the Internet to ngsaskus@nationalgeographic.com. Include name, address, and daytime phone number.

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Why does this Arctic creature have four legs and no head?

Do you know? Go online to nationalgeographic.com/ngm/tellus/0012 and test yourself, or read it here in next month's issue.

NOVEMBER ANSWER: He is lifting the cover of a secret tunnel where Vietcong soldiers hid during the Vietnam War.

BATES LITTLEHALES



Homemade spectacles frame a boy's eyes at a village near the revered Blue Nile. Named for the azure cast of its waters during dry months, the river turns earthy brown during the rainy season, rushing across Ethiopia in a series of gorges whose rapids few have traveled.



The Blue
ETHIOPIA'S
SACRED
WATERS
Nile



THUNDERING OUT OF THE HIGHLANDS, the Blue Nile—or Abay Wenz, as Ethiopians know it—plunges 150 feet before racing into a narrow canyon. “At a distance all the water seems to be turn’d into mist and foam,” wrote Pedro Páez, a Jesuit who in 1618 was the first European to glimpse Tis Isat Falls. “A little after it is so confin’d among the rocks, that it can scarcely be perceived.”



From Mount Gishe's 10,433-foot summit, Marigeta Birhane Tsige, an elderly clergyman in the Ethiopian Orthodox Church, looked down at what many Ethiopians consider the source of one of Africa's great rivers, the Blue Nile, its waters emerging

from bubbling pools hidden behind a thicket of trees and shrubs in a close-cropped, alpine meadow. The spring of the Blue Nile, or Abay Wenz (meaning "great river") as it is called in Ethiopia, forms one of the holiest places in the country, the turbaned priest explained. And, indeed, around the edges of the spring were gathered numerous villagers, waiting to fill their containers—gourds, bottles, canteens, and plastic jerry cans—with holy water.

"Yes, yes. They seek the power of the Abay," Marigeta (which means "holy instructor") Birhane said. In exchange for a promised future sacrifice of a sheep or young heifer, the spirit in the spring's waters might be enticed to cure a thousand ills, to bless a farmer with a bountiful crop, or to break an evil spell.

The Blue Nile, he continued, may surface first here on the side of Gishe, but its true font, its absolute source, lies beneath the mountain.



“The mountain floats on a lake,” he said, sweeping his hand sideways to illustrate. “And from that lake flows the Abay. It starts like this.” Leaning forward, he extended his left palm, and with the forefinger of his right hand traced a spiral like one in a nautilus shell. “The river flows in every direction,” he said, “north, east, south, and west, making the sign of the cross.”

It was that spiraling journey, he added, that gives the river’s waters their powers. From here the spring’s waters course downhill into an alpine stream that bends its way through the mountains to the shores of Lake Tana. Other streams pour into the lake too, emerging on the southeastern side at Tis Isat Falls (“smoke of fire”) as the Blue Nile proper. Marigeta Birhane, who had followed much of the Blue Nile’s route, knew that other rivers ran in more-or-less straight lines from source to mouth. But the Blue Nile wound like a mainspring through the land.



PUTTING HER FAITH in the Abay’s healing power, a woman crouches with her child as an Ethiopian Orthodox priest showers them with water from the spring some regard as the Blue Nile’s source. Some believers stay on to become monks and nuns at Mount Giske, where a memorial feast for two of the faithful begins with the blowing of a horn.

“It circles around Ethiopia,” he said, “so it’s like a herder boy sent out to protect the cows.” He pulled back a moment. “You know, the Italians bombed us here [in 1935]. But they never defeated us. They had the power of bombs, but we had a greater power: We had the Abay.”

For more than a month a team of explorers and I had been following the circuitous course of the Blue Nile in Ethiopia. Before visiting the spring at Mount Giske, we had hiked and rafted the river from below Tis Isat Falls to the Sudanese border, a journey of more than 500 miles. Over that distance the Nile drops nearly 4,000 feet and in places has carved out a canyon 15 to 20 miles wide, as vast and terraced as the Grand Canyon.

As the first expedition to travel the entire length of the Blue Nile in Ethiopia in an unbroken journey, we discovered that among Ethiopians the Nile has a decidedly mixed reputation. It is loved and hated, revered and feared, treated like a saint and despised like the



A small hydropower plant at Tis Isat Falls intercepts some flow. From there the Blue Nile travels undammed for more than 500 miles, carrying the runoff of Ethiopia's highlands into the desert. Politics as much as lack of funds has kept Ethiopia from tapping the river for electricity or irrigation. The Abay supplies two-thirds of the flow of the Nile in Egypt. Lacking a treaty, Ethiopia and Egypt argue over who owns the water.



worst sinner. It sweeps away precious topsoil; its waters boil by without leaving a drop behind; it is infested with crocodiles, hippopotamuses, and malaria-bearing mosquitoes; and its deep, moatlike channel splits the country in two. At the same time its waters are regarded by Orthodox Christians and animists alike as harboring powerful spirits, some like devilish demons, but another that is almost akin to God.

"Be sure you give some bread to the Abay," one woman with a blue cross tattooed on her forehead cautioned us as we started our hike along the upper Blue Nile Gorge southeast of Lake Tana. "There are bad *jinn* [spirits] in the water that might reach up and grab you."

Her warning didn't seem that implausible. Just below the thunderous cascade of Tis Isat Falls, the Blue Nile churned its way through a narrow-sided canyon of black volcanic rock. It was early September, the end of the rainy season in Ethiopia, and the Nile's waters were swollen and heavy with silt. Far from

being blue, the river was a mean, muddy brown, and it roiled by us angrily, its waves slapping long, dirty

fingers against every rock in its path. It was easy to imagine one finger rising up to drag you in, and I gladly tossed the river the last of my granola bar—and hoped that the spirits liked it as much as they did bread.

There were other potential *jinn*—or at least dangers—associated with the river. The Blue Nile isn't only a river of magic to Ethiopians, it is a river of great strategic importance. Sweeping in a big-bellied, 560-mile arc through the central highlands of the country, it has been used many times as a blockade. Since only two small brick-and-mortar bridges spanned the river's canyon until this century, warring kings and princes could retreat to their mountaintops beyond the Nile and feel as secure as if they'd pulled up a drawbridge behind them. Today three additional two-lane concrete-and-steel highway bridges cross the Nile, tenuously linking the halves of the country. Some months before we arrived, a border war had flared up between Ethiopia and Eritrea to the north—and these bridges were now under heavy guard. The Ethiopian government granted us special permission to raft beneath two of them.

Other worries: notorious gangs of bandits, known as *shifta*, who hide out in the gorge (and had attacked previous expeditions);

■ SOCIETY GRANT

This Expeditions Council project was supported by your Society membership.

Treated like a saint and despised like the worst sinner . . . its deep, moatlike channel splits the country in two.

crocodiles the size of small dinosaurs and with tempers to match; suffocating heat; parasites and fevers; questionable rapids; tribesmen on the lower reaches who are prone to throwing spears first and asking questions later. Against all these we had only our luck—and a prayer tossed to the Blue Nile.

Ten people, including three boatmen, a paramedic, and an interpreter, made up the core of our group. But at the start of the trek below Tis Isat Falls, our team expanded into a large, rangy retinue. With guides, porters, donkeys and their wranglers, and other assorted camp followers milling about, we looked more like an unwieldy caravan of traders than an

A SINGLE ROPE is the only link between the east and west banks of the Abay at the Second Portuguese Bridge, whose central arch collapsed when Ethiopian patriots undermined its footings during the Italian occupation of 1935-1941. Just four other bridges span the river, which for centuries served as a defense for Gojam, the region it encircles.

expeditionary force. It wasn't always clear who was in charge or where our team began and ended, not that it mattered: The trail, a black clay path, was beaten into the land from tens of thousands of farmers' bare feet and was easily followed.

We met dozens of people heading to or from the city of Bahir Dar on the shores of Lake Tana, a long day's walk from their farms and villages on the plateaus and mountains above the Blue Nile Gorge. They stared at us and our white skin in disbelief. Most of them had rarely, if ever, seen *ferenjocch* (white foreigners) and certainly not white foreigners hiking in the countryside. But we were staring too. These highland Ethiopians were largely Amhara, the people who dominated the country during the reign of the Emperor Haile Selassie. Tall and slender, with high cheekbones, even teeth, and large, dark eyes, they were strikingly handsome in their turbans, robes, and white embroidered dresses. Many of the women wore silver or wooden crosses at their necks (a sign of their devotion to the Orthodox Church), while most







WINDING A LONELY COURSE westward, the Blue Nile snakes along the bottom of a canyon valley bordered by steep cliffs, where erosion has left only barren earth. The landscape is so rugged that in 1925 it offered "the only bit of pioneering exploration left in Africa," according to British consul R. E. Cheesman, who mapped the river by journeying along adjacent plateaus.



of the men, we couldn't help but notice, carried automatic weapons—Kalashnikovs and G3s.

Most of our guides and porters were similarly armed, since they belonged to their village's militia and the government requires them to bear their arms at all times. One, Kes Yeshambel Berhanu, was also a priest and, alongside his Kalashnikov, wore a large brass cross on a metal chain. It seemed a curious mix of talents, but apparently only to us. Almost every villager we passed recognized our well-armed priest and stopped to seek his blessing and to kiss his cross. This was protection of an altogether different sort, and as other riflemen strode down the trail, we were glad of the bristly yet holy image our team projected.

Our trail downstream followed the left-hand

bank of the Blue Nile, first keeping so close to the river's edge that with the water at flood stage the main path at times vanished beneath the muddy flow. Ethiopia's spring comes at the end of the rains, and the land we walked through was vibrant with its flush of new green grasses, yellow daisies, freshly sprouted fields of teff—a kind of millet—and corn. Bowers of star jasmine, tumbling through the branches of acacia trees and euphorbias, scented the air, and buffalo weaverbirds darted among the shoreline shrubs like big golden bees.

Fifteen miles downstream we parted ways with the Blue Nile. Our path led up onto a high, cultivated plateau, while the river dropped into a sheer-sided, black basalt canyon. The gorge's basalt flowed out of fissures in



the earth some 30 million years ago. The flows lie on top of layers of limestone and sandstone, and they are more than a mile thick in places—yet all that rock poured out in a million-year period, geologists have recently discovered. This hard volcanic rock is the guiding hand that gives the Blue Nile its curvaceous route.

With the river roaring through its canyon a good half mile below us, we trekked past clusters of round, thatch-roofed homes and fields of teff edged with low stone walls and clumps of daisies. On both sides of the gorge the land rose in broad-shouldered, terraced mountains, each flat bit of land quilted with a patchwork of fields that shimmered green and gold in the sun. In many fields small groups of men, women, and children squatted on their

haunches, laboriously weeding each row by hand. Some stared in amazement as we passed; others rose and made three or four quick bows in greeting. One farmer stopped his team of oxen, walked away from his plow to the edge of his field, and cracked his whip into the air. He then cupped his hand around his mouth and whooped the news of our arrival to his neighbors down the valley. Others felt compelled to rush up to shake our hands and offer us thick slabs of *injera* (bread) or invite us to their homes for coffee.

“*Tenaystellegn!* May God give you health!” we learned from our guides to call out. “*Endemen adderachehu!* Good morning to you!”

But some still trembled in fear at our approach. A teenage woman, carrying a water jug on her back, simply dissolved into tears.

“She’s not seen a white person before,” said our interpreter, Zelalem Abera Woldegiorgis. A square-jawed young man, who had traveled throughout his country as a guide, Zelalem knew how to ease her fears. Taking her gently by the hand, he spoke softly for a few minutes, assuring her of our good intentions—and explaining that our skin condition wasn’t a communicable disease.

“We only saw pictures of *ferenjocch* before—photos with their intestines, stomachs,

COFFEE WELCOMED expedition members to one of many Gumuz villages along the southern reaches of the Blue Nile, where *ferenjocch*, or foreigners, are rarely seen. The Gumuz marveled at the visitors’ strange appearances. “It was endearing,” said boatman Bruce Kirkby. “They would stop at nothing to inspect every inch of your body.”



First I heard the donkeys stampeding past my tent. There was the flash and loud crack of a Kalashnikov.

and hearts coming out,” said Atele Asseras, the headman in the village of Genet Yamaryam, referring to pictures of dead Italian soldiers taken during the Italian occupation of Ethiopia some 60 years ago. “We never saw one up close until now.”

Atele’s small mud home was now full of fer-enjocch, five of us having accepted his invitation to drink coffee. We sat on low wooden stools, while his wife roasted handfuls of coffee beans, then wafted their rich fragrance over us. Atele wasn’t the first Ethiopian to mention the Italians to us; no one, it was apparent, had forgotten that bitter period of history, and more than once we’d had to reassure small groups of armed men who eyed us suspiciously that we were not part of an invading army.

“I did see one of you once before,” Atele continued, pointing to the boatman, Michael Speaks, who had rowed the upper section of the Blue Nile Gorge in 1996. “You were down there on the river in your boat, and I thought, ‘What’s this? Are these Italians coming to invade?’ I had you in the sights of my gun,” he said, nodding at his Kalashnikov, which hung against a wall. “I was going to shoot, but then you waved.”

“Ohhhh,” Speaks said, “my mama doesn’t need to hear this.”

We laughed and sipped our coffee—and decided to wave to everyone we saw.

SOME SOUNDS WAKE YOU in an instant; you know even before you’re fully awake that something is wrong. First, in some foggy part of my mind I heard the donkeys stampeding past my tent. Had a hyena attacked them? I sat up, then heard the sound of men running. They were shouting. There was the flash and loud crack of a Kalashnikov being fired. One shot. Then another, and a third. I dropped to the floor of my tent, my heart leaping, while two more shots echoed in the night.

Were we under attack by the shifta? More shouts, but the gunfire stopped, and we called out questions from our tents. Was everyone all right? What, in God’s name, had happened?

Only a donkey thief, Zelalem explained. He’d got away, but without his prize.

In the morning the people in the nearby village complained that our men had not shot the thief. “He’s surely not a man from here,” they swore. “We have no thieves among us.” “More likely,” said another man, with a blue turban and a pirate’s copper ring glinting in his ear, “it was a spirit. A devil from the Gihon that took the form of a thief. That’s why you couldn’t shoot him.”

The Gihon—yet another name for the Blue Nile and one with strong biblical connotations. To the people in these villages set smack along the rim of the gorge, the Nile was one of the four rivers that flowed out of Eden at the beginning of the world. It was the river in Genesis that “compasseth the whole land of Ethiopia,” and in its waters lived a king also named Gihon.

“Some nights Gihon comes to the surface with his lights,” explained a woman with a white shawl pulled over her finely plaited hair. “If he sees you, he may attack you, so you must look away.” There were small devils in the water’s depths too, shape-shifters, she said, like our donkey thief.

A morning’s steep downhill hike had taken us back to the Blue Nile’s edge, where the second of the two old brick-and-mortar footbridges crosses the water. Its proper name is the Second Portuguese Bridge, but in 1935 Ethiopian patriots broke the middle arch in an effort to stop the Italians, and so the bridge is called simply Broken Bridge. People still use it but rely on the stoutness of a rope and strong men on either side to pull them across. The rafts and gear for our journey to the Sudanese border were waiting for us there.

While we loaded the boats, a steady stream of villagers crossed on the rope, letting their legs dangle over the white foamy rapids where Gihon dwelled below. After crossing, some stepped onto the rocks above the bridge, undressed, and sat in an eddy, while others poured water over their heads. “They are being baptized,” Zelalem said. “They’ll take some holy water home for their families too.”

Our packing interrupted some of these religious activities as people stopped to marvel at what few had ever seen: not only white people but boats on the Blue Nile. “They look like airplanes,” a stocky militiaman named Kassa Mongenet told Zelalem about our oar-powered rafts. “Surely, this is *tarik*—a major historical event!” We’d bid our other guides and porters farewell at the bridge but hired Kassa—and his Kalashnikov—to join us. Kassa could swim, he said, but he also knew that there were devils in that water, and he eyed its brown boiling surface warily.

By midmorning we were ready to go, and Speaks and the other two boatmen pulled on the oars, steering the rafts into the river’s main channel. In an instant, like every other bit of flotsam tossed into the Blue Nile’s muddy waters, we were on our way to Sudan.

It took a week to raft this first section of the river, a 120-mile stretch from the Broken Bridge to the modern Abay Bridge. Along this course the river alters its southeasterly route,

curving straight south and forming the deep bend that swings through the heart of Ethiopia. That we could make this expedition at the turn of the 21st century on a river the size and energy of the Blue Nile was by itself surprising. Most comparable rivers were dammed or diverted for irrigation long ago. But aside from a small conduit below Tis Isat Falls, which channels some of the river through a hydroelectric station, the Blue Nile remains uninterrupted until it crosses the border. At Roseires Dam, 50 miles inside Sudan, the river’s steady surge is finally halted, its waters corralled in a long, lazy reservoir.

AGAINST A SURGING CURRENT, traders ferry goats to the far shore at a crossing where the water runs swift, making crocodiles scarce. Although commerce does not move along the Abay, it crosses the river on merchants’ rafts. These traders bought the goats cheaply on the south side of the Blue Nile and will sell them in Gojam.





Beyond Roseires Dam the Blue Nile wanders along, drifting over the hot Sudanese plains for another 300 miles until it reaches its confluence with the White Nile at Khartoum. The two join forces there, becoming the Nile and pushing on to the Mediterranean another 1,850 miles away.

OF THE TWO NILES, the White is the better known, and perhaps the more glamorous, in part because of the mystery of its source, which wasn't discovered until 1862. In contrast, Ethiopians have for centuries regarded the spring at Mount Gishe as the start of the Blue Nile, and in 1618 they readily guided a Jesuit priest, Father Pedro Páez, to the same marshy meadow that I would later visit. But this spring was the only thing the Blue Nile gave up easily. The highland Ethiopians seldom ventured into its narrow canyon, fearing its heat, malarial airs, and evil spirits.

Consequently, on maps its course remained merely a dotted line until the late 1920s, when Maj. R. E. Cheesman, the British consul, surveyed the river in his spare time. Putting a boat on the river was out of the question; a few such attempts had been made, but the boats ended up smashed in the rocky rapids. Instead, over an eight-year period the doughty Cheesman mapped the river on foot and muleback. He had hoped to travel beside the river but quickly discovered this was impossible: The mountains and sheer canyon walls that rise above the Blue Nile were far too steep for such a journey. He settled for tracking the river's course from the high plateaus and the river's side when he could reach it.

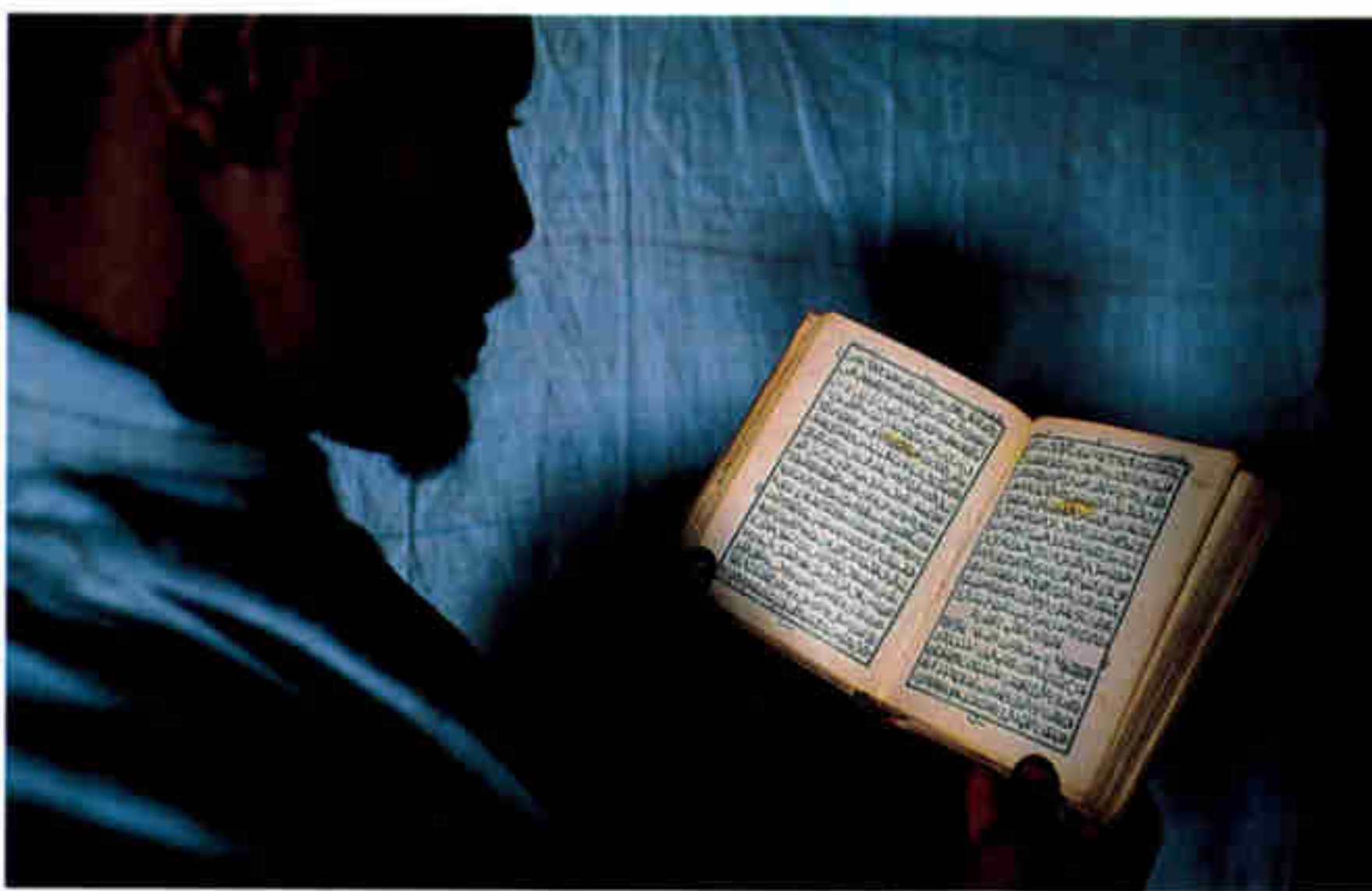
Not until the 1950s did anyone succeed in getting far down the Blue Nile in a boat, and not until 1968 did a team finally travel the length of the river in Ethiopia. But even this latter group, led by British explorer Col. John Blashford-Snell, was forced to divide the river into sections, journeying down the lower Abay at the end of the rainy season, then returning to the upper gorge after the water level subsided. Since then a few other groups have rafted portions of the river.

From the reports of these previous boaters, we knew that we would hit rapids, especially with the river at high water. But because it was unclear how big or dangerous these rapids


would be, we watched the Blue Nile closely, studying every bucking wave and surge as if watching the paces of a young pony.

For the first dozen miles of our river journey, where the Blue Nile is still fighting its way through a narrow basalt canyon, the water felt bunched up and reined in, and it kicked up short, choppy waves that we splashed across lightheartedly. These small trains of rapids always ended in a series of deep-sucking whirlpools that sent our boats spinning helplessly downstream. It could catch us any time it wanted, the river seemed to say, and toss us about like so many rubber ducks. Kassa mistrusted the swirling dark waters and studied them intently as if searching for the passage to the devil's world. But it was daytime, the sky a clear blue above the sheer canyon walls, and if the Nile harbored any demons, they were content to let us pass.

It seemed far more likely that any dangers were going to come from the canyon above. From there people could see us long before we could spot them. If we were rubber ducks to the Nile, we were sitting ducks for anyone with bad intentions perched along the gorge's rim. We knew the stories. In 1968 the Blashford-Snell team fought two gun battles with shifta who crept down on their camp in the night. They'd been forced to take to their rafts in the



GUARDIAN OF THE FAITH, an Amhara priest stands below St. Raphael in a monastery on Lake Tana's Dek Island. In the 1500s the Christian Amhara stopped pagan Borana invaders at the Blue Nile, the western limit of the Amharic empire. A Borana man (above), whose ancestors settled near the river and converted to Islam, reads the Koran.



SMOKE CHOKES a Blue Nile valley whose trees have been cut, buried in pits, and set to smolder into charcoal—in defiance of a government ban. It takes four to five trees to make one 60-pound bagful, which sells for about two dollars on a nearby road, the first link in a market network that extends to the capital of Addis Ababa. With the trees gone, rain will carry the soil into the river below.



We were sitting ducks for anyone with bad intentions perched along the gorge's rim.

dark and run the canyon's rapids blind. An American hiking the length of the gorge had simply vanished; other rafters had been pelted with rocks by unseen assailants. And Michael Speaks had nearly been shot. How would the local people react when they saw three boats bearing eight white foreigners downstream?

Our first hint came as we rounded a bend and saw a group of people running along the canyon's rim. They were clapping and dancing, cheering us on.

"Konjo! You are beautiful! Gobez! You are brave! Melkam gouzo! Good travels!"

Their shouts and trilling calls followed us downstream for miles—an outpouring of goodwill and innocence we hadn't anticipated and that made us feel ashamed. Where were the bullets, rocks, and thieves?

"You are tarik for them," Zelalem said several times, using Kassa's expression to explain how wonderful and novel our journey was for these countryfolk who celebrated our passage with such joy. "They will never forget you."

We traveled 16 miles that day, riding along with the Nile as it wound through the canyon in tight bends, twisting first left, then right,



cutting under the cliff in places and hollowing out caves and arches in others. Hundreds of clear streams and waterfalls spilled down the canyon's walls into the river. Along some of these grew tangled thickets of ferns and tall green reeds, lending the little silver waterways a tropical air. In contrast, the bare rock of the canyon felt harsh and sere; not without reason do the highland Ethiopians refer to the bottom of the gorge as the desert. Occasionally we passed wide, sandy banks, and on one we spotted our first crocodile. But it was only a small crocodile, and it slithered at once into the safety of the river.

On our next day of rafting the canyon began to widen. We rowed past two dark basaltic towers rising from the river like crumbling chimneys and in the next moment entered a



WET SEASON RAINS swell the Blue Nile, lifting the expedition's rafts over dangerous rocks that scuttled previous river runs. Warned of armed bandits who had murdered travelers as they slept, the expedition encountered only the guns of village militias raised by the government to bring law and order to a formerly wild region.

world not unlike the Grand Canyon. On each shore the river had carved out wide plateaus that rose up in tiered steps separated by bands of red sandstone and creamy limestone. Wherever the earth was flat enough to be tilled, there were crops of millet, corn, and sorghum—but no villages. The few people we met explained that their homes were higher up, on the top of the plateaus, often a three- or four-hour walk away, where it was cooler and malaria-bearing mosquitoes were rare.

As the Blue Nile shot south, other rivers joined it. Their waters swept down steep canyons and through braided gravel channels, then spilled into the main river, increasing its force and flow and forming high V-shaped waves, which tossed us about like untamed broncos. We saw goliath herons, hammerkops, and stately fish eagles hunting for their dinners. Wire-tailed swallows and half-collared kingfishers skimmed over the river, flashing feathers of a brilliant blue, while troops of ver-vet monkeys and baboons ran along the shore.

Most nights we found good campsites where the Nile briefly widened out, forming broad sandy banks. And although we were a long distance from any village, people—usually men—came to visit nonetheless. We were most visible to people living on the far shore. To





reach our camps, they ran down the canyon, found a log to use as a float, then stripped off their clothes and kicked their way across the river, a good hundred yards, all the while holding on to their hunk of wood as if it were a boogie board.

That was how we met Melese Menesha, the medical officer from Mertule Maryam, a village so far up one of the distant plateaus we could not see it. A spare man with flaring cheekbones and dark curly hair, Melese warmed himself by our campfire and told us in a soft voice that he'd never met a white person before but decided to visit us since he'd heard that white people have excellent medicine. Perhaps we had some new knowledge to teach or some of the latest miracle drugs to give him?

I wished we did. But after he explained the doctoring he does—dispensing pills for headaches and birth control and giving quinine injections to those suffering from malaria—it was clear that he had far more medical training (and a better medical chest) than we. He had a radio, too, in his village home and filled us in on the latest news from the Ethiopian-Eritrean war. It had not ended, and Zelalem and Kassa shook their heads in dismay.

Melese left at dawn the next day, kicking his way back across the Nile's rough waters. "He is a progressive thinker," Zelalem said, watching him in admiration, "and look at where he lives." I was thinking the same thing and winced at how ill-prepared we were for meeting men of progress along the Blue Nile. We had expected bandits and spear-throwers, not paramedics who listened to the BBC.

MEN LIKE MELESE would, in time, certainly bring changes to the Blue Nile. But many others we met, such as the livestock traders, lived much the same life that merchants here did several hundred years ago. Now, as they always have, traders from the villages in the Gojam region cross the Nile on wooden or goatskin floats, then hike up the plateaus to markets in Borana country. They buy goats, donkeys, horses, and cattle at a good price, then march the animals to the river and swim them to the other side. For them the Blue Nile was simply an irritating barrier.

Watching one man kicking across the river while simultaneously holding the heads of his



NOSE PIERCING and old-fashioned tobacco pipes survive among the Gumuz, farmers who fled to the steamy, malarial lowlands that border the Blue Nile to escape slave raids and the expansion of Abyssinian rule. Now the government is bringing welcome development to their remote home—schools, health clinics, and new agricultural methods.

three goats above the waves, I was struck again by the limited use the highland Ethiopians make of all this water. They seek it out as a holy source, and those who live close enough lead their herds to it to drink. But although a team of Ethiopian and American engineers drew up plans for dams and irrigation projects some 40 years ago, none have been built because of the high cost and politics involved. Instead, the local farmers continue to depend solely on the rains. The rains had been meager in the past few weeks, and we could only imagine the farmers' frustration as their corn and barley turned brown while the Nile's waters rushed by below.

"They have a proverb about this," Zelalem said. "In the summer the Abay plows with black oxen, but where he sows corn, only pepper sprouts." Like many Ethiopian proverbs, this



A JAM SESSION south of the Abay celebrates Ovanda, a Gumuz hero who, according to song, "is always sleeping with the girls." While villages still gather for friendly horn-blowing contests, the government discourages other traditions, inducing the Gumuz to wear clothes, stop hunting, and give up exchanging daughters as wives.







LOSING ITSELF in Lake Tana, the Gilgel Abay, or Little Abay, joins other tributaries that feed Ethiopia's largest lake. Just upstream, villagers offer the Little Abay chickens and *araki* liquor in a ritual older than Christianity. Sometimes the river waters their crops. Other times it floods their houses. Always they seek its blessing.

one tells a tale on several levels, but its overall meaning, Zelalem explained, is simple: "The Nile takes our soil and gives us nothing in return." Why, the farmers wonder, can't the Nile slow down and linger for awhile?

ANOTHER 150 miles downstream, past the two modern concrete bridges, where the Blue Nile curves westward to Sudan, the river does give the farmers what they need: land saturated with rich topsoil and water. Not long after the river takes that turn west, we rode its waves into the broad valleys of the Gumuz. A Nilotic people, their skin is a deep, lustrous black, their faces broad, with delicate, birdlike features. They'd suffered for years at the hands of the highland Ethiopians, who until the 1930s regularly raided Gumuz country for elephant ivory and slaves. The elephants are nearly all gone

now, hunted out, although we did see an occasional hippo and numerous crocodiles. We met many Gumuz people too, since they live beside the river, raising sorghum, cotton, and cattle.

Few foreigners had ever traveled this section of the river, and we caused instant consternation. Children ran in terror down the riverbanks, women fled into the sorghum fields, and men seized their Kalashnikovs and stood ready to face us down—whatever we were.

"Come quick, come quick!" one group of children called to their parents. "There is something big flying down the river."

With long oars stroking the water in circles, our boats looked like giant geese flapping downstream, their parents explained. Others thought we must be flying airplanes or driving cars on the river. And whatever had happened to our skin?

"Your eyes are like cats', and your hair is like a baboon's . . . or maybe a goat's." "Watch out," one man cautioned the honey-colored Zelalem, "you're starting to fade like them."

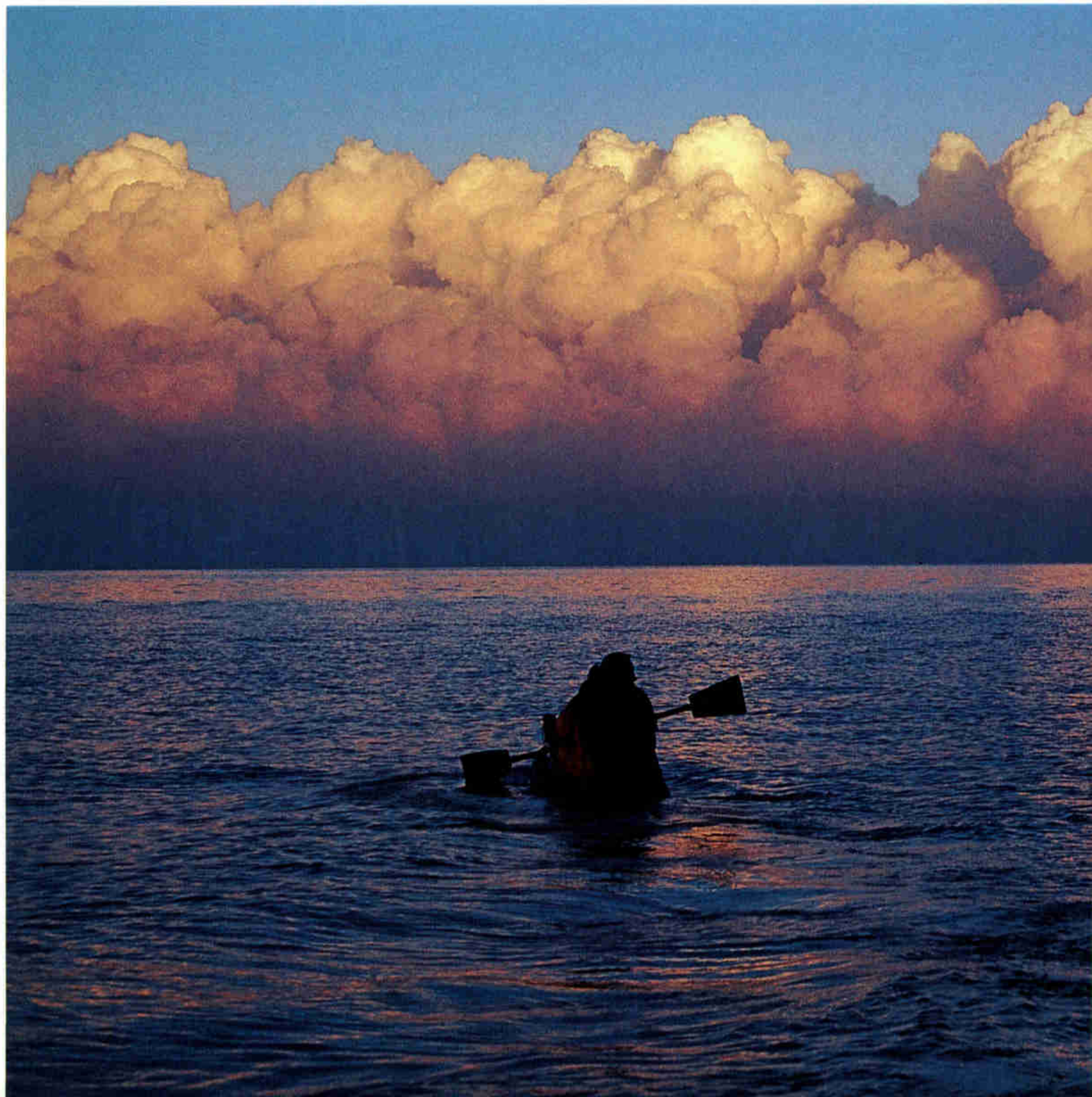
One group of villagers, planting beans along the riverbank, dropped their hoes and ran home to fetch their musical instruments to celebrate our journey. They returned with horns made from gourds and bamboo, some a foot in length, others extending from their

mouths to the ground. The men and boys puffed out their cheeks like Dizzy Gillespie to play their horns, then blasted the air all at once with the call of trumpets, trombones, bugles, and saxes. “It’s a song,” our Gumuz guide explained through Zelalem—one with a universal theme. “My girl has big breasts and a big behind; she is the shapeliest and most beautiful of all.” When we asked if they had songs about the Blue Nile, the people looked at us blankly.

ALL IS CALM as two men paddle across Lake Tana on *tankwas*, or papyrus boats. At lake’s end, the Blue Nile turns violent as it begins a descent of some 4,300 feet to meet the White Nile at Khartoum. Unharnessed and largely unknown to people living along its course, the Abay pours wild waters through the heart of an ancient land.

The river was the river, we were told; there weren’t any devils in it or kings or gods. They still used the highlanders’ name for the Nile—Abay—but perhaps because the river gave them water and good soil, the spirit had left it.

That didn’t mean that trouble couldn’t come down the river. And a few times we were thought to be it. We woke one morning to see a large group of armed men across the river. One waved a white flag at us, while others called out that we must stop and show them our permits. Their weapons assured that we did. A good two dozen militiamen had gathered, some dressed in khaki uniforms, others in old suit jackets with turbans wound round their heads. Many had tribal scars on their cheeks; all looked unhappy. We might be taking arms to someone, they feared. And who was Zelalem, an Eritrean in disguise? Our sheaf of permits



“Gihon is surprised by this unexpected offering, and he is happy. He will give you his blessing.”

didn't satisfy them; one turbaned fellow, nursing his Kalashnikov in both arms, scowled and waved our papers away, saying the best thing to do was to follow them to their headquarters—a six-hour walk away.

A cold, pelting rain had begun to fall, and the thought of a long walk to some distant police station made us look as unhappy as our hosts. Only Zelalem's artful diplomacy saved us. He listened patiently to every fear and complaint, let every man have his say, then carefully explained our journey to them once again. How could we be aiding Eritrea, when it lay far to the north, and we could only travel

downstream? Furthermore, like them, he was an Ethiopian and a patriot.

Slowly the scowls fell away. Someone asked to have his picture taken, and in the next instant the militiamen were jockeying with one another for the best camera angle and fiercest pose. When we ventured back onto the Nile, they ran along the banks to wave good-bye.

For most of our journey the Blue Nile had churned along beneath the rafts at a speed of eight to ten miles an hour. But as we approached the Sudanese border, the river grew sluggish. We were nearly 40 miles from the Roseires Dam, but already it had caught and trapped the Nile. The river's frisky spirit was gone, there were no demons or kings in its depths, no rumbling stretches of whitewater. When we took the boats out at the border town of Bumbadi, we bade farewell to a river so tamed and placid we called it Lake Abay.

LATER I RETURNED to Lake Tana with two guides, making my own loop around Ethiopia. We took a boat up the lake to the mouth of the Little Abay, the Little Blue Nile, where the local people also worship the river as Gihon. Although it was not the time of year to give sacrifices to the Nile, I asked if an exception could be made. The villagers agreed, and from them I bought coffee, a bottle of *araki* (a liquor), three chickens, and a sheep, which they duly presented to the river in a simple ceremony. When the chicken carcasses and sheep's intestines floated instead of sinking, the people smiled and relaxed. “That's a good sign,” one elder explained. “Gihon is surprised by this unexpected offering, and he is happy. He will give you his blessing.”

The Blue Nile, in all its forms, had surprised me too. Now, sitting with these villagers on the shores of Gihon, feasting on chicken and sheep, I smiled at my good fortune, and this last blessing from the Great Abay. □

MORE ON OUR WEBSITE

Watch an interview with Virginia Morell as she shares tales of the Blue Nile, and see more of Nevada Wier's photographs at nationalgeographic.com/ngm/0012.



BABY STEPS

Polar bear triplets just days out of the den follow in their mother's foot-steps on their first journey to the Hudson Bay coast. Canada's Inuit call this initiation *atigtug*, "bears going down to the sea."



Bear

BEGINNINGS

NEW LIFE ON THE ICE

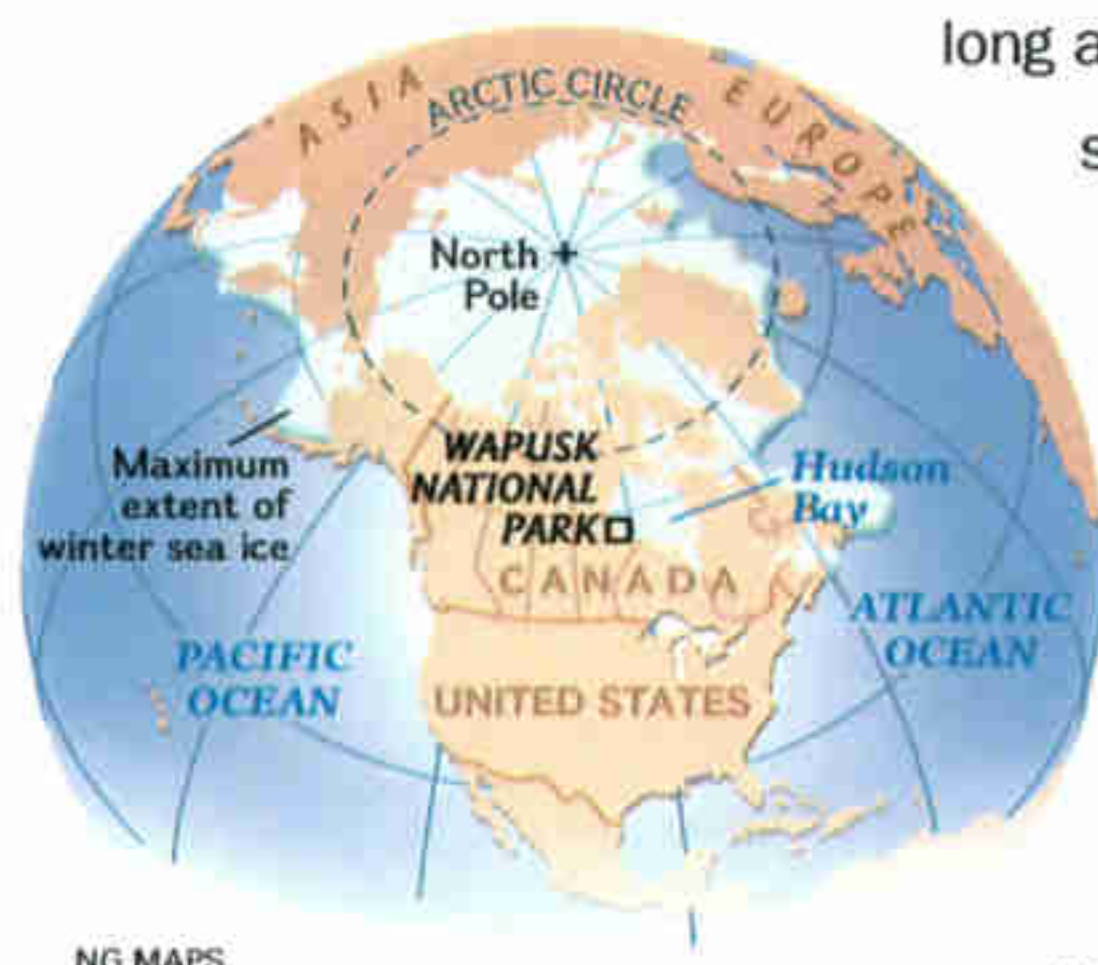




ARTICLE AND PHOTOGRAPHS BY NORBERT ROSING

In spring, polar bear mothers in Manitoba's Wapusk National Park emerge from dens with cubs three months old and ready to face the world. The sow has fasted for as long as eight months, but that doesn't stop her young from demanding full access to her remaining reserves. If there are triplets, the most persistent stands to gain an extra meal (below), and it may eat at the expense of another. Faceless in the background, the runt of this litter is weak, having forfeited many meals to stronger siblings. Females are protective of their cubs but tend to ignore family rivalry over food. In 11 years of photographing polar bears, I've only once seen the runt of triplets survive until autumn.

With one less obstacle to overcome, twins—the most common litter size—seem to live in the lap of luxury (left). A pair gorging on fatty milk keeps me rapt for hours. Even from far away I hear the smacks of their suckling and through my lens catch sight of sticky mouths coming up for air. On this gusty day the bears are smarter than I am. They lounge in the shelter of trees while I stand my unprotected ground.





A slumbering giant is unmoved by her cub's struggle to scale her, but I am thrilled at the spectacle—and pleased my cold fingers are quick enough to capture the series. Living like a bear but not nearly as well insulated, I shiver even in the moderate 20°F air after hours standing still, waiting for action. But this is mild weather for the sow, and maybe that's why she doesn't seem distressed by a photographer and snowmobile in plain sight. The cub isn't yet fat and furred enough to be invulnerable to the elements and, if it lost its mother, could easily starve or die of exposure. Ascending "mother hill" helps the young bear grow strong, but it may be more than two years before it is a capable hunter ready to live on its own.







Punishment is swift for a cub that strays up the snowbank without permission. The sow grabs and grounds it with a low growl, despite the cub's screams of protest. Earlier the mother was more tolerant as the same cub wrestled roughly with a sibling in her embrace (right). Setting the stage for both discipline and play, the day den is a temporary family shelter. With her massive paws the sow flung snow to excavate the pit, then bedded down, her peat-stained body against the wall. Bears often interrupt their seaward journey to rest, play, and nurse, and I change film excitedly to

record their behavior. I have no doubt that this mother and master hunter is careworn and ravenous, but she won't rush her cubs on the days-long walk to the sea—despite her own immediate need to hunt seals on the pack ice.

The family scene, as always, is fatherless. Nomadic males play no role in cub rearing and can be dangerous to young bears, so females with cubs tend to avoid them. I am relieved to see that the runt—despite its weakened state—is still in the picture, a tiny ball of fur not quite hidden by its mother's side (above).



Their world an unending playground, the triplets romp and roll at the feet of their protector (below). On a more frigid day an attentive female encircles her cub with maternal warmth (right). With the windchill pushing the temperature to minus 60°F, I am reduced to warming equipment and frozen fingertips against the engine of my idling snowmobile, while a roll of film shatters like glass in my hands as I try to load it. Under these conditions the trick is to work carefully and slowly, though some great moments will pass unrecorded.

Sadly, all is not well in the bears' realm. While park boundaries and hunting quotas have helped protect the animals from guns, new threats arise. Chemical pollutants now contaminate the food chain, and mining and offshore drilling could degrade bear habitat. Recent warming trends in the southernmost reaches of polar bear range have accelerated pack ice melting, cutting short the bears' spring seal hunt. How they and other Arctic wildlife will fare under these changing conditions remains uncertain. For the moment I see only a noble survivor on the landscape, protecting her young from Arctic wind and other hazards of life on the ice. Knowing the unseen threats to her kind, I am fortunate to have had a glimpse of her world. □

MORE ON OUR WEBSITE

How close can you get to a mother polar bear? To find out, watch an interview with Norbert Rosing at nationalgeographic.com/ngm/0012.





THE DAWN OF HUMANS





Hunt for the First Americans

The search for the first humans in the Americas, which has led scientists into dirt, mud, and contortions of body and mind, continues in a cramped cave on an island in southeast Alaska. Paleontologist Timothy Heaton, troweling the floor, has found animal bones with dates spanning the past 40,000 years. This means that Ice Age people coming from Siberia could have lived on this coast, previously thought to have been buried under glaciers. A flood of new data has thrown the study of early Americans into exciting disarray.

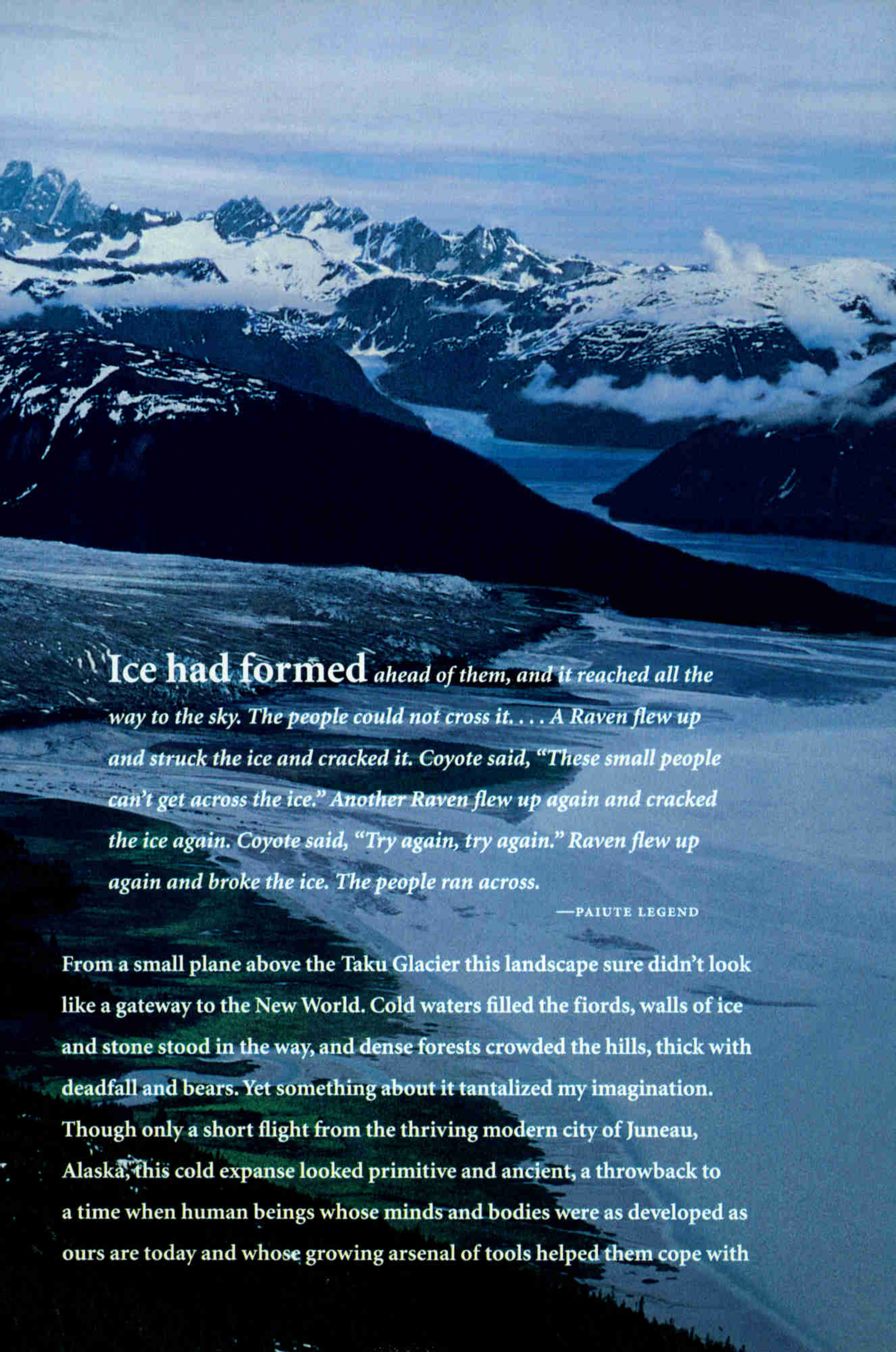
By MICHAEL PARFIT

Photographs by KENNETH GARRETT



**14,000 YEARS AGO
SOUTHEAST ALASKA**

Were migrants blocked by solid ice sheets, or did the land offer patches of open ground that people could live on, like these bordering the Taku Glacier near Juneau?



Ice had formed *ahead of them, and it reached all the way to the sky. The people could not cross it. . . . A Raven flew up and struck the ice and cracked it. Coyote said, "These small people can't get across the ice." Another Raven flew up again and cracked the ice again. Coyote said, "Try again, try again." Raven flew up again and broke the ice. The people ran across.*

—PAIUTE LEGEND

From a small plane above the Taku Glacier this landscape sure didn't look like a gateway to the New World. Cold waters filled the fiords, walls of ice and stone stood in the way, and dense forests crowded the hills, thick with deadfall and bears. Yet something about it tantalized my imagination. Though only a short flight from the thriving modern city of Juneau, Alaska, this cold expanse looked primitive and ancient, a throwback to a time when human beings whose minds and bodies were as developed as ours are today and whose growing arsenal of tools helped them cope with

any climate finally began to occupy Earth's last temperate landscape.

Of course this is all speculation. There's absolutely no solid evidence that the first human

SOCIETY GRANT

Research Committee projects are supported by your Society membership.

beings to come to the Americas passed anywhere near this coastline. But today the study of who the first Americans were,

where they came from, and when they arrived—always a contentious business—is in turmoil. In this atmosphere even scientists have loosened the reins on that restless racehorse called speculation and let imagination run.

This is a bad time if you want certainty about the first Americans but a good time if you like informed mystery. Discoveries in the past decade have cast old concepts in doubt,

while others haven't fully developed to take their place. Just enough new information has come to light to enchant the mind with alternative theories, but it's not solid enough to eliminate the old ones. We have entered a period of widespread questioning.

Ten years ago most experts would have agreed that the first Americans arrived about 14,000 years ago by walking across a land bridge connecting Siberia and Alaska, then traveled south through an inland corridor between continental ice sheets.

Today scientists who are researching the story of the first Americans—archaeologists, physical anthropologists, DNA experts, linguists—disagree on some fundamental parts of that story. Instead of an arrival 14,000 years ago, some scientists now place humans in the Americas 15,000, 20,000, or even 30,000



or more years ago. Some suggest that instead of a single first migration, people came in a complex series of waves. The idea that they walked across land has been challenged by theories that some came by boat. And in a very controversial debate over the shapes of skulls, even their direct relationship to today's Indians has been questioned.

I flew my plane across Taku Glacier at the start of a journey that spanned the Americas, from Alaska to Tierra del Fuego. Many of the sites I visited were excavated with support from the National Geographic Society. On this trip I saw some of the evidence that has led to the present period of questioning. I listened both to the interpretations of archaeologists and to the traditional memories recorded in Native American oral histories. The science told me of the honest—and difficult—accumulation of

facts that must underlie any real story of the past, and the oral histories reminded me of the fundamental need of all peoples to explain their beginnings.

Madumda made new people from willow wands, taught them to hunt with a bow and arrow, how to make baskets, and how to eat, and then he went home to the north. But these people went bad too, so Madumda sent ice down to kill them all.
—POMO CREATION STORY

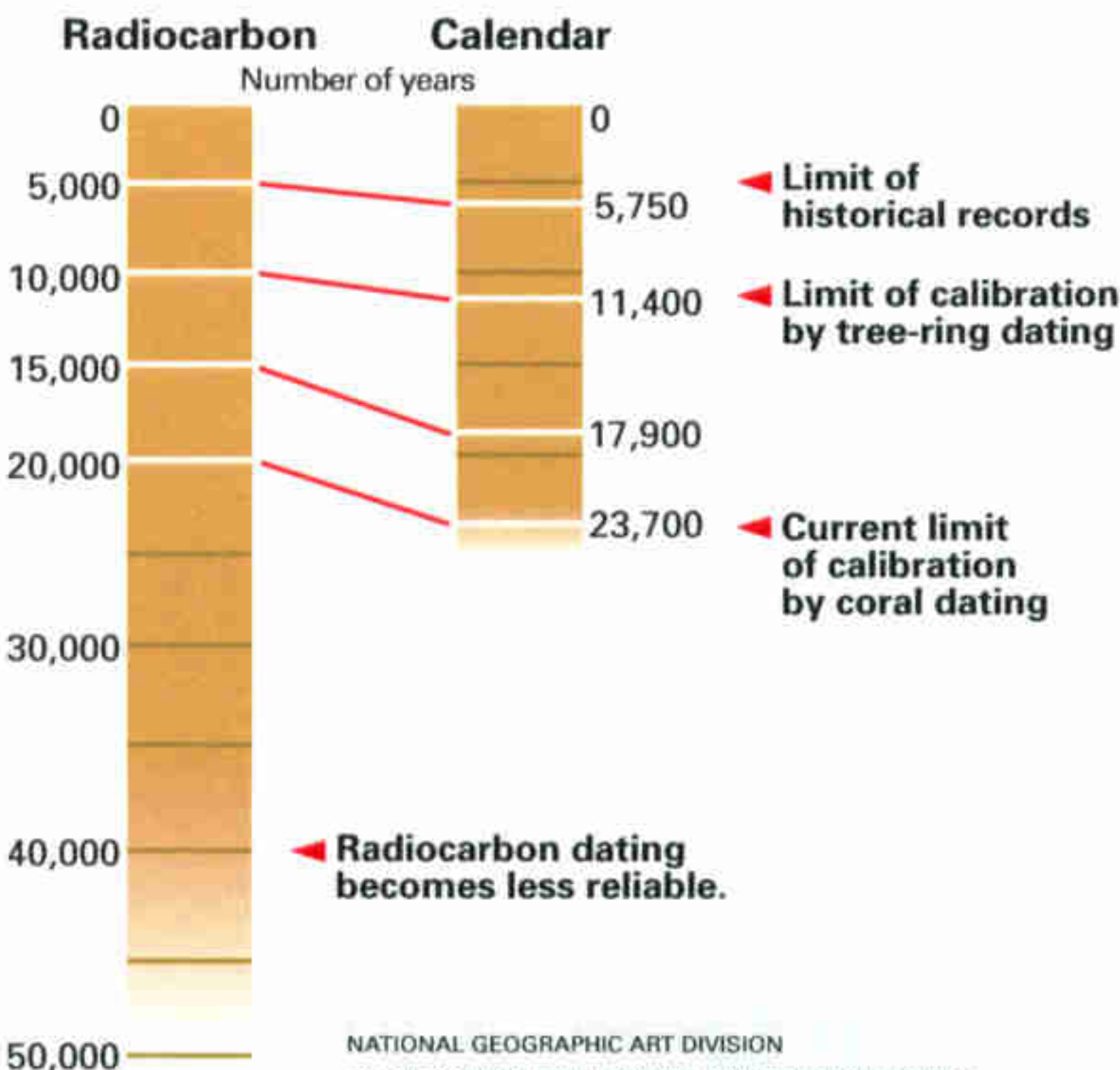
In 1929 a teenager named Ridgely White-man wrote to the Smithsonian Institution about what he called warheads that he had been finding near Clovis, New Mexico. The spearpoints were elegantly chipped to sharpness on both edges and finished off with a groove, or flute, down the center of each side.



18,000 YEARS AGO VIRGINIA

Time dominates debate over the first Americans. Tools grouped on the sand at Cactus Hill in Virginia (left) may be among the oldest found. From the top, clockwise, the groups range from the most recent to the oldest—from 10,000 to perhaps 18,000 years old. Some archaeologists think Cactus Hill tools (right, at right) resemble tools from southwestern Europe, at left, and that early arrivals may have crossed the Atlantic.

Radiocarbon years do not quite match calendar years, but by carbon dating tree-ring and coral samples of known age, scientists create calibration scales to convert radiocarbon dates into calendar ages. Such calendar-year dates are used in this article.



THICK-POINT TECHNOLOGY

Cross-sectional view

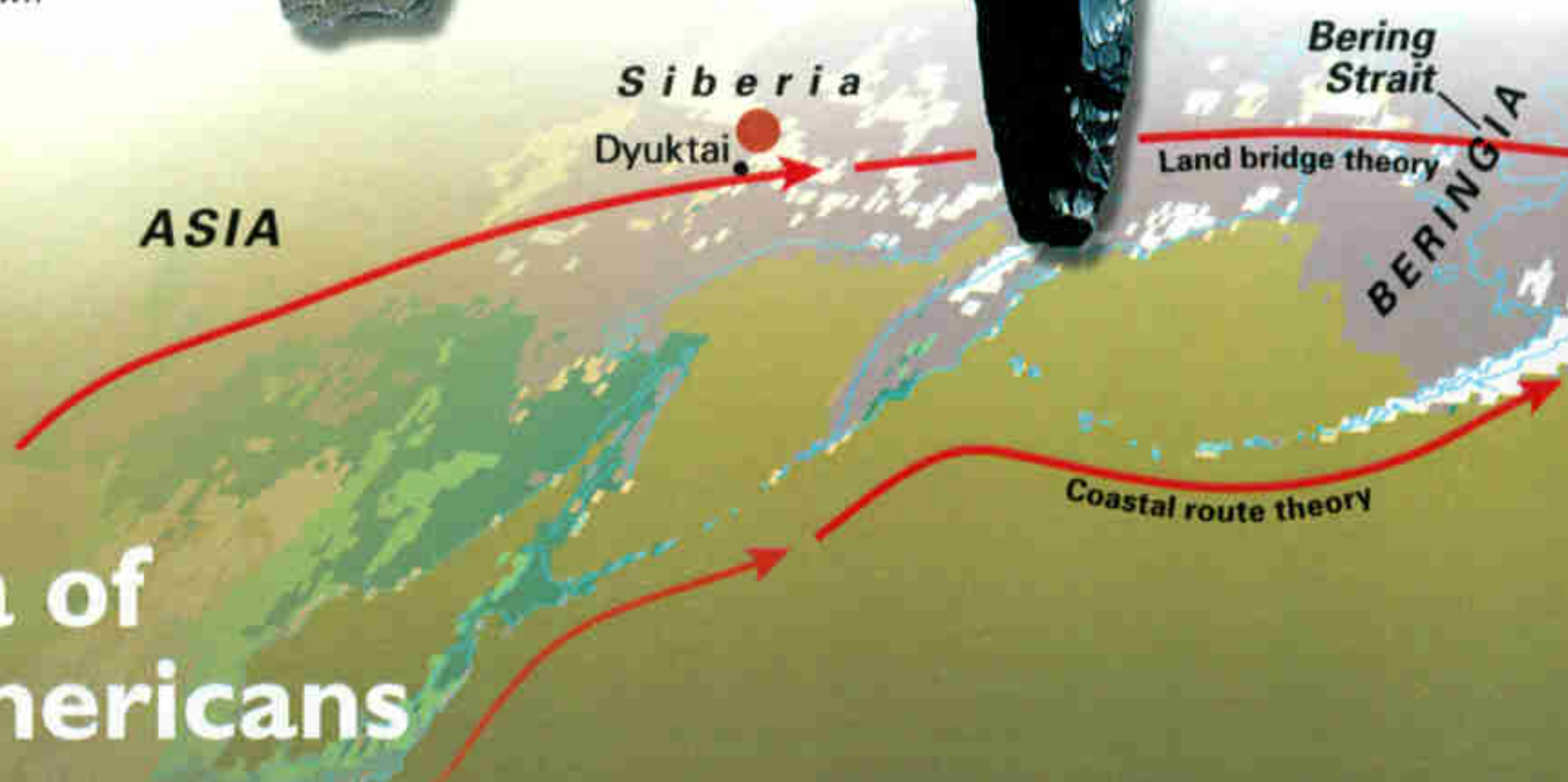
Dyuktai
Siberia
14,000 years old

Mesa
Alaska
13,700

Haskett
Idaho
9,000

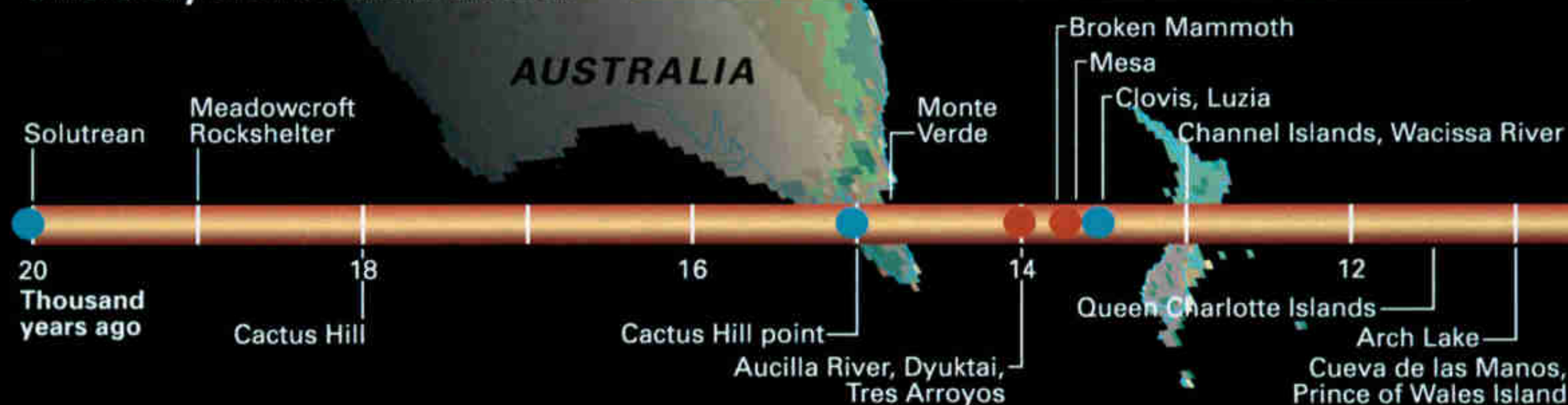
Cross section.....

Points not shown to scale



The Enigma of the First Americans

"No matter how it happened, you have to look at these people as explorers," says C. Vance Haynes, a geoarchaeologist from the University of Arizona, "probably young guys who were really bent on what's over the next hill." Until recently the preferred theory traced an overland route from Siberia across Beringia, a region exposed by low sea levels, then south through a corridor between ice sheets. New evidence about the early habitability of the Pacific coast has added the idea of a coastal route. Testing of the 10,500-year-old bones of a man (casts shown at right) found near tools in an Alaska cave revealed that he had a marine diet, proving that by then people lived along the coast. Some analysts say certain North American tools (facing page, top) share characteristic thinness and flaking style with tools from Europe—one argument for a controversial theory that people boated across the Atlantic; in Siberia people flaked tools differently and left them thicker.



THIN-POINT TECHNOLOGY



Clovis
North America
13,500



Cactus Hill
Virginia
15,000



Solutrean
Southwest Europe
20,000



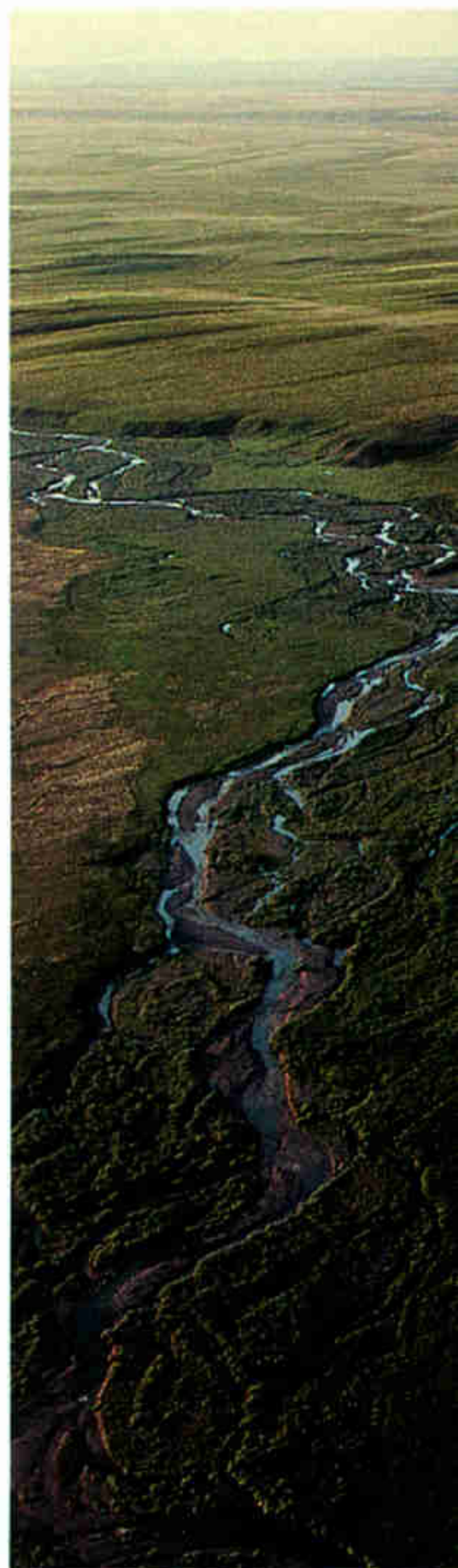
Eventually such fluted points turned up in the oldest archaeological excavations elsewhere in North America.

Stone can't be carbon-dated, but the dating of organic material found with the tools showed that the people who used them were in America no earlier than about 13,500 years ago. The story most archaeologists built on these ancient tools was of a people they nicknamed Clovis, who came into North America



13,800 YEARS AGO ALASKA

"When you're here you're still nowhere," says a sign near the Mesa site (right) in northern Alaska, but this may have been on the way to everywhere. It is in eastern Beringia, which probably looked much like this at the end of the Ice Age. Technology had to unlock northern climates to occupation, so the bone needle (left) found at Alaska's Broken Mammoth site with artifacts that date back 13,800 years is crucial. "Unless you're freezing in the dark, you don't think about it," says Mesa excavator Michael Kunz, "but you've got to make weather-tight clothing, and you have to have the needle to do that."



via Siberia, moved south through the ice-free corridor, then dispersed, their descendants occupying North and South America within a thousand years. Since their tools were often found with the bones of mammoths and other large creatures, scientists usually described the Clovis people as big-game hunters.

For decades attempts to find proof of earlier people failed the rigorous tests of archaeological science. As late as 1996 a prominent archaeologist, Frederick Hadleigh West, could state in a major book that "Clovis is taken to be the basal, the founding, population for the Americas." But in the past decade that certainty has been dramatically shaken.

The most straightforward challenge to the old story is the matter of time. The era in which the Clovis people lived is limited by a time barrier that stops about 13,500 years ago. Two things create that barrier: the dates of

organic material found with the tools and geologic evidence that the ice-free corridor would not have been open much before then.

But in 1997 a blue-ribbon panel of archaeologists visited a site in Chile called Monte Verde and agreed that people had lived there at least 14,500 years ago, about 1,000 years before the first sign of Clovis people in North America.* Acceptance of the Monte Verde date not only broke the time barrier but focused new interest on other sites with early dates.

One of these, Cactus Hill, south of Richmond, Virginia, has produced artifacts in layers of sand below Clovis tools. Dates there, which may go as far back as 18,000 years, are based on analysis of burned wood found near tools in what Joe McAvoy, chief archaeologist at the site, says are hearths. Dates at another site, the

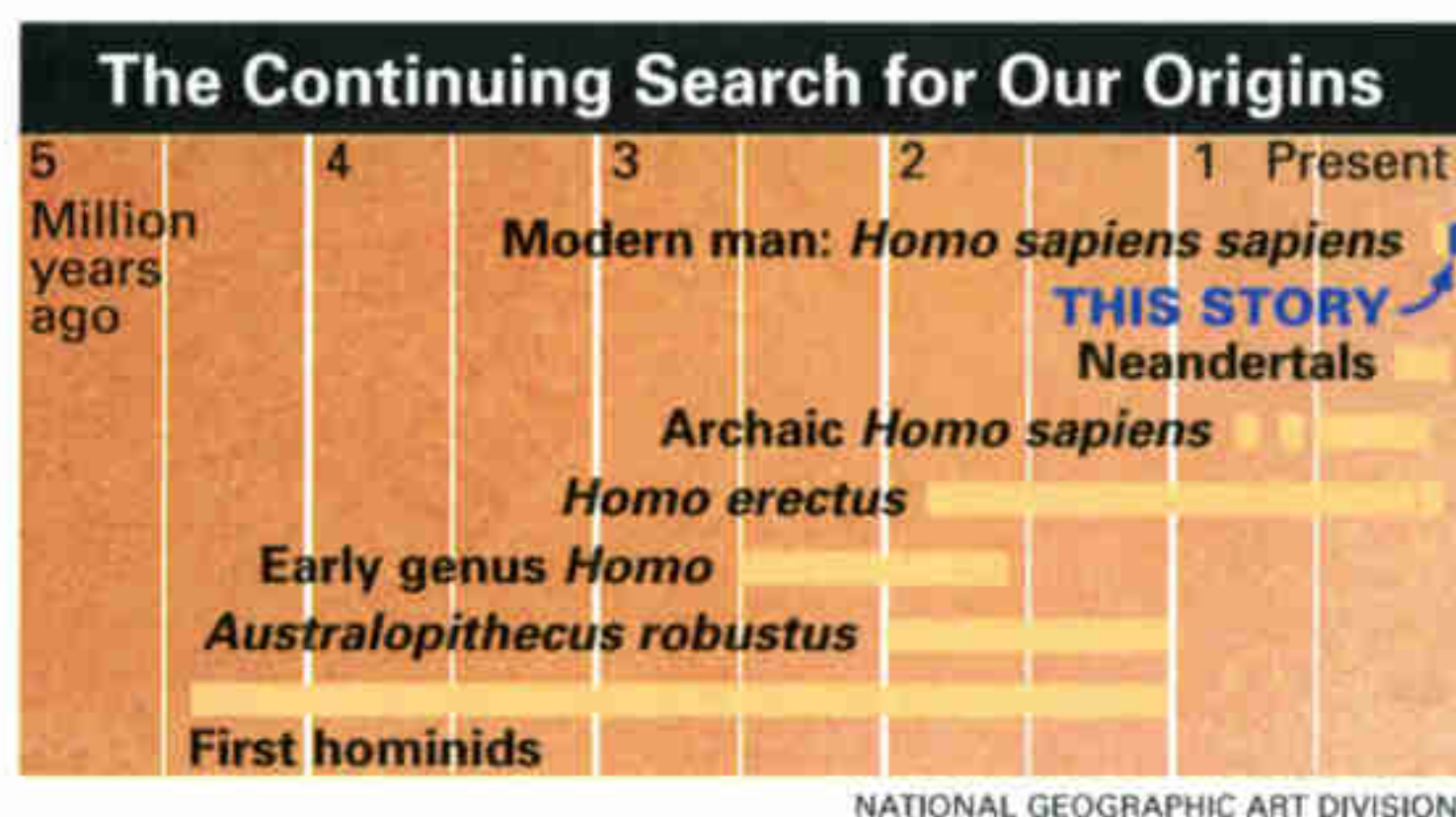
*See "The Most Ancient Americans," by Rick Gore, NATIONAL GEOGRAPHIC, October 1997.



Meadowcroft Rock-shelter near Pittsburgh, Pennsylvania, show that people may have lived in North America nearly 20,000 years ago.

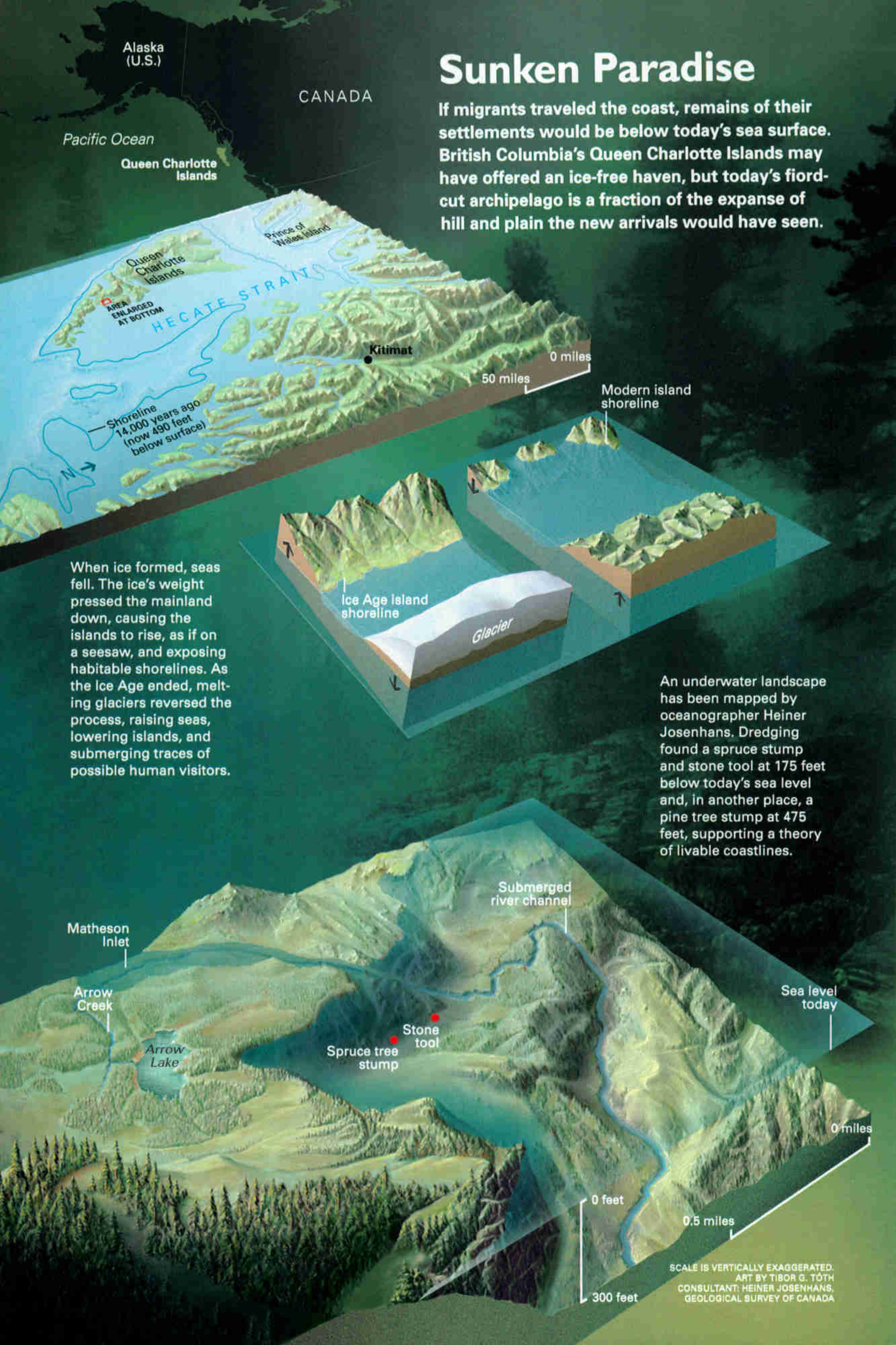
These early dates have been augmented by one DNA study that suggests, based on assumptions of a steady rate of DNA change, that people were in the Americas as early as 30,000 years ago and by at least one linguistics expert who argues that the large number of language families in North America proves that people were here well over 20,000 years ago.

Disagreement on all these theories is vociferous. Most early dates are based on carbon dating, which is a fairly precise science, but



often there's uncertainty about the degree to which ancient tools are physically associated with the plant or animal material nearby that can be dated. The organic material may be contaminated by another substance.

At Meadowcroft, for instance, archaeologists who were skeptical of the early dates believed that the samples had been contaminated by groundwater seepage bringing in older carbon materials. (A recent study indicates that didn't happen, strengthening the Meadowcroft evidence.) Sometimes archaeologists disagree about the layering process that is also an indication of time. Some scientists are uncomfortable that at Cactus Hill only a



Alaska
(U.S.)

CANADA

Pacific Ocean

Queen Charlotte
Islands

Prince of
Wales Island

Queen
Charlotte
Islands

AREA
ENLARGED
AT BOTTOM

HEGATE STRAIT

Kitimat

0 miles

50 miles

Modern island
shoreline

Shoreline
14,000 years ago
(now 490 feet
below surface)

When ice formed, seas fell. The ice's weight pressed the mainland down, causing the islands to rise, as if on a seesaw, and exposing habitable shorelines. As the Ice Age ended, melting glaciers reversed the process, raising seas, lowering islands, and submerging traces of possible human visitors.

Ice Age island
shoreline

Glacier

An underwater landscape has been mapped by oceanographer Heiner Josenhans. Dredging found a spruce stump and stone tool at 175 feet below today's sea level and, in another place, a pine tree stump at 475 feet, supporting a theory of livable coastlines.

Matheson
Inlet

Arrow
Creek

Arrow
Lake

Submerged
river channel

Spruce tree
stump

Stone
tool

Sea level
today

0 miles

0 feet

0.5 miles

300 feet

SCALE IS VERTICALLY EXAGGERATED.
ART BY TIBOR G. TÓTH
CONSULTANT: HEINER JOSEPHANS,
GEOLOGICAL SURVEY OF CANADA

few inches of sand are said to represent thousands of years of time.

Arguments over these uncertainties can be public and fierce.

“YOU KNOW IT’S A GOOD DAY in archaeology,” said Al Goodyear, “when you get up in the morning and there are 200 people and a TV crew looking in your pit.” I was at the Topper site in southwestern South Carolina at a weekend meeting for archaeologists hosted by Goodyear. There were newspaper reporters and photographers, documentary filmmakers, and even a local TV station with a truck that had cranked an antenna on a pole into the tops of the trees in the hopes of broadcasting live.

They were all here because Goodyear had uncovered flakes of stone that looked like those made by humans. The flakes were found in sand below material dating from about the time of Clovis. It was another apparent break in the time barrier.

The presence of a TV crew indicated to some scientists that the story of the first Americans had become too popular and immediate for its own good.

“Ideally everything should be hashed out by the experts first,” said Stuart Fiedel, a consulting archaeologist and the author of a book about American prehistory. “But that hasn’t been the pattern for a long time.”

Fiedel himself is part of that public pattern. He is the author of a scathing critique of the Monte Verde findings that appeared in a popular archaeology magazine. Fiedel attacked the evidence for Monte Verde’s breaking the time barrier by claiming that the way some artifacts were recorded wasn’t precise enough to support the conclusions. The critique was immediately attacked by some archaeologists and supported by others.

One of those who had endorsed the Monte Verde findings was C. Vance Haynes, a geologist preeminent in the study of stratification at archaeological sites. But in response to the critique Haynes wrote that he was backing away from his endorsement of the Monte Verde results. Though Fiedel’s critique seemed to rebuild some of the broken time barrier, most archaeologists accept the Monte Verde date.

To me the breakthroughs at Monte Verde, Cactus Hill, and Meadowcroft were exciting, and I wondered why some archaeologists



11,500 YEARS AGO

QUEEN CHARLOTTE ISLANDS, CANADA Archaeologist Daryl Fedje cleans mud from rocks, looking for artifacts. The tray’s contents were dredged from more than 450 feet down, where forests grew during the last ice age (left). Earlier, Fedje found a stone tool at 175 feet on what may have been a habitable riverbank 11,500 years ago.

seemed so cautious about dynamic new ideas. When I asked Haynes about that, he told a story of his own experience.

In the late 1950s Haynes worked on a dig in Nevada called Tule Springs, which reportedly predated Clovis sites. There prehistoric animal bones were associated with apparent hearths dating back more than 28,000 years.

What Haynes found instead was that the charcoal in the hearths wasn't charcoal at all but decaying vegetation on its way to becoming coal. The dates were right, but there had been no hearths—and no humans.

"That was a real learning experience for me," Haynes said. "It makes you cautious. You begin to see how easy it is to misinterpret things."

The time barrier is just one issue in the search for the first Americans. Another piece of the puzzle is how they got here.

ON THE NORTH EDGE of Alaska long slopes were white with cotton grass, and pools of water shimmered softly in their short flow from one night's ice to the next. I stood on top of a hump of rock called the Mesa, where ancient tools have been discovered near remnants of hearth fires. Mesa is near the route people might have followed if they had come across Alaska and taken the ice-free corridor to the south. Was this the way they had come?

The Mesa site is in northern Alaska, but in the deeper context of geologic time it is in eastern Beringia. Beringia is the name of the chunk of land that, until about 11,000 years ago, connected Siberia and Alaska. Beringia has been called the Bering land bridge, but that phrase gives too narrow an image. Scientists have long believed that Beringia was the route the first



immigrants took from Asia to North America.

For years archaeologists have hoped to find a strong connection between early Alaska artifacts and those farther south, which might show the route used by the first Americans. Tools with characteristic Clovis flutes have been found in Alaska, but none has been dated. And many early Alaska sites contain microblades, which were probably embedded in the sides of bits of antler or bone to make tools like knives. Microblades are seldom found at Clovis sites.

To explain this apparent lack of connection, some archaeologists say that it's entirely possible that the whole population of the Americas could have been started by one small group of people—as few as a couple of dozen—who dashed desperately through the ice-free corridor. They would have left no

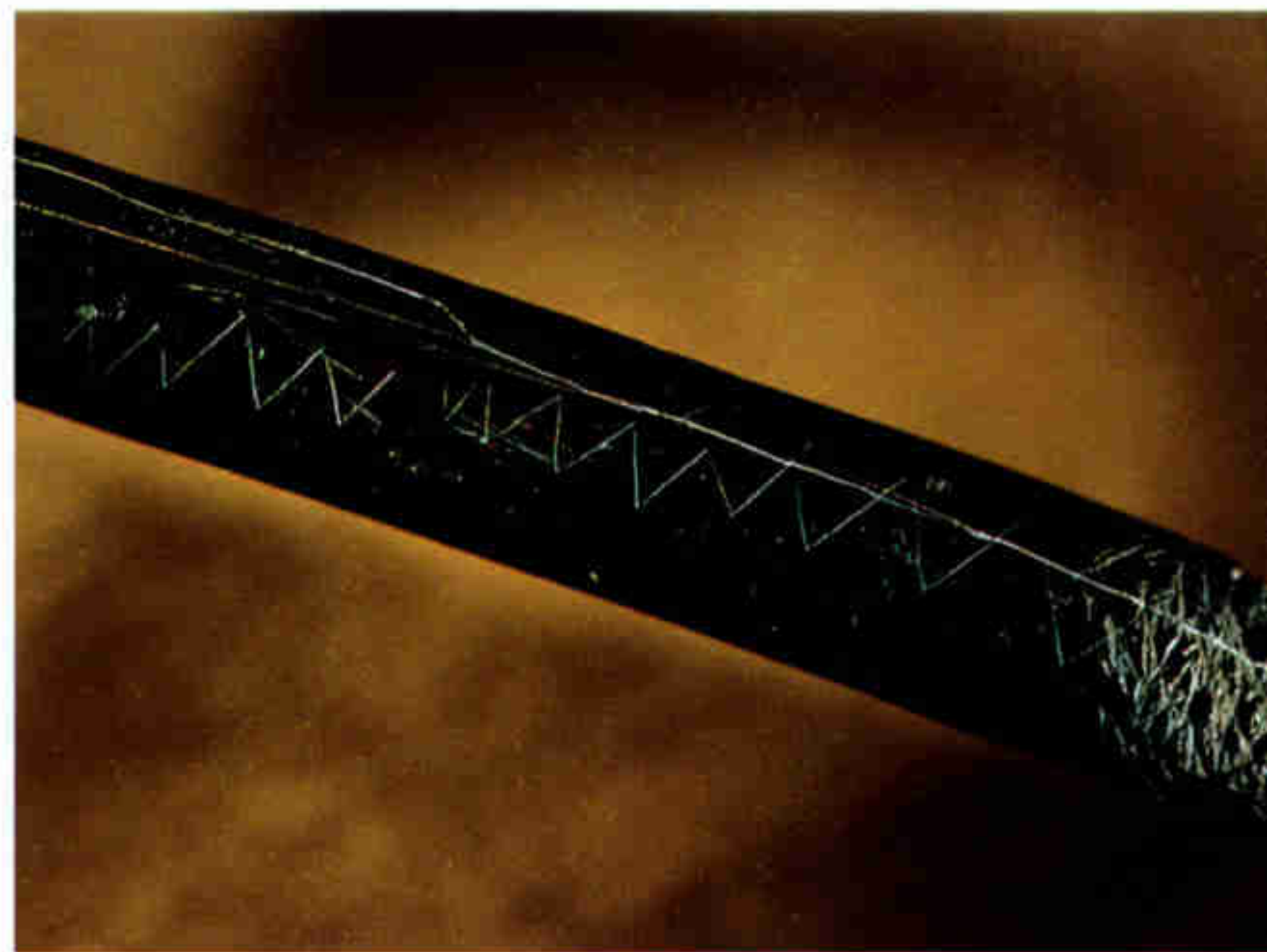
trace in their wake because of the speed of their movement, and they could have developed the distinctive Clovis tools later to kill the big game they found when they reached the Great Plains.

Bureau of Land Management archaeologist Michael Kunz, project director at Mesa, believes that the tools he has found there are a link between Alaska and the south because of shapes and flaking techniques that look similar to some tools from the Great Plains. But other archaeologists disagree. Some argue that the Mesa site represents people of later years moving north instead of south, and yet others think that the tools were left behind by occasional visitors from other parts of Alaska. These varied opinions, all based on the differing ways that individuals analyze the same collection of shaped rocks,



14,000 YEARS AGO AUCILLA RIVER, FLORIDA

To get closer to traces of ancient societies, geologist Harley Means (left) swims to a site in Florida's Aucilla River. In most dryland digs only stone survives, but here divers have found a trove of bone and ivory tools preserved in water. The tools add versatility to the image of early Americans. A decorated spear (right), probably of mastodon ivory, was carved when the tusk was fresh, proving that people here lived among animals that became extinct some 13,000 years ago. Aucilla tools have been dated back 14,000 years, but, says David Webb, the project's principal investigator, "You've got to be a little fuzzy about your time schedule."



reminded me of something a Canadian archaeologist had told me.

"We are a discipline, not an exact science," she said. "We shouldn't pretend we are. Everything is subject to interpretation."

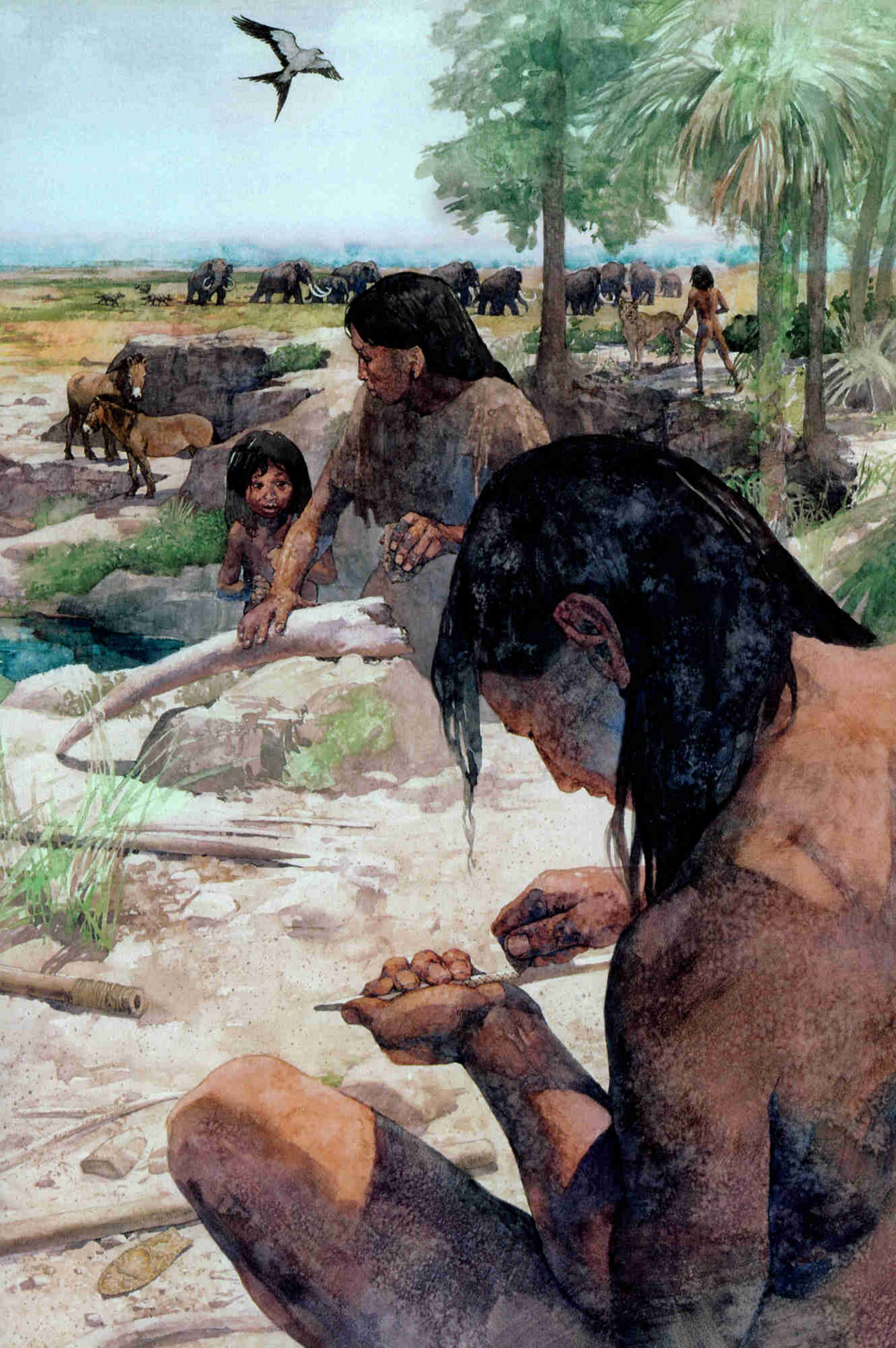
As I traveled south in hot pursuit of the phantoms of early America, those words would echo. Although parts of archaeology are based on hard science, such as carbon dating, archaeological fact is never more than consensus based on relatively few samples. Today, in spite of increasingly rigorous research, consensus on some critical issues appears to be far off.

"It's chaos," more than one archaeologist told me.

But it is a fertile kind of chaos, with new ideas brewing everywhere in the mix.



Fact and imagination mingle in art to re-create life 14,000 years ago beside Florida's Aucilla River, which in those times of lower groundwater was a series of pools. Families gathered to hunt animals like the Pleistocene horse and the mastodon, now extinct. Facial features, hair styles, and other details are derived from knowledge of later peoples. Almost all that remains of the very first Americans is their tools.





19,000 YEARS AGO

NORTH AMERICA Caught in a shadowland between speculation and proof, archaeologist Michael Collins (above, at left) seeks evidence of the past in central Texas, where 12,000 years of history stand exposed in a 20-foot bank at the edge of the San Gabriel River. The spear-points and bone toolmaker (below) found by chief investigator James Adovasio at Meadowcroft Rockshelter in Pennsylvania (right) are dated as far back as 19,000 years—dates that have undermined established concepts that people settled here only about 13,500 years ago. “We are in the theoretical chaos that follows the collapse of a long-held theory,” says Collins.



LOST TWICE IN A MAZE of trees, I finally heard the roar of a generator and followed the sound to a cave. It was a little hole in a stone cliff surrounded by tarp shelters, hoses, wires, and buckets of mud, but the scientists excavating there think that its contents will help break what might be called the ice barrier. The cave is on Prince of Wales Island in southeast Alaska. Until recently this area was thought to have been completely buried by glaciers during the last ice age, forming a barrier to migration. No more.

“Plants and animals lived in this area all along,” said Timothy Heaton, a paleontologist, as we crouched in the cave. “Conditions



would have been very compatible with human habitation.”

James Dixon, an archaeologist working with Heaton, and others suggest that in addition to the humans walking across Beringia, some made their way into North America from Asia by boat along the edges of land and ice.

“There had to be pockets of ice-free areas,” Dixon said, standing in a trench outside the cave. “There’s no reason people couldn’t have come along the coast, skirting the glaciers just the way recreational kayakers do today.”

A few years ago Heaton and colleague Fred Grady found parts of a human skeleton in the cave. The bones were dated to about 10,500 years ago, and other tests revealed that the person had been raised almost entirely on seafood. Though not as old as Clovis, the bones showed that a maritime culture was well under way.

“By then people were already living up and down the coast,” Dixon said. “They had watercraft and engaged in trade.”

Evidence that early Americans used boats also comes from the Channel Islands off



Face-to-face With the Past

A reconstruction of 9,500-year-old Kennewick Man (right), whose skeleton was found in Washington State in 1996, deepens the mystery of early Americans. Physical anthropologists Doug Owsley and Richard Jantz, whose work includes identifying skulls of crime victims, statistically analyzed thousands of skeletal measurements to find links between populations.

Skull comparisons (left) may link Kennewick Man more closely to Ainu people than to Mongolians, Native Americans, or Euro-Americans. Ainu once roamed coastal Asia but now live only in northern Japan.

Owsley cautions that the link is not definitive. "The ancient skulls are not like anybody living today. But if you force a comparison, Kennewick Man looks like an Ainu first."

Controversy flared when five Indian tribes sought to bury the skeleton without study.

"We cannot lose history before Columbus," says Owsley, one of eight scientists who have sued to assure access.

"We already know our history," says Armand Minthorn of the Umatilla tribe. "We view [the study] as a desecration."

Kennewick Man knew conflict too. He had a stone spear-point buried in his hip.



• 27,000 years old, Upper Cave, China



• 10,600 years old, Spirit Cave, Great Basin, North America



• 9,500 years old, Kennewick Plateau, North America

Prehistoric evidence

Comparing modern skulls



• Ainu, North Pacific Rim, Asia



• Mongolian, Asia



• American Indian, Great Plains, North America



• Euro-American, North America

- Similar profiles and top views
- Moderately wide and long skull shapes with forward-projecting upper faces
- Short facial and nasal heights
- Moderate cheekbones

- Similar profiles and top views
- Short, broad skulls
- Wide, long faces with large cheekbones

- Long, narrow skulls
- Narrow faces and nasal widths with smaller cheekbones
- Prominent, steeply angled nasal bones

CONSULTANTS DOUGLAS W. OWSLEY AND DAVID R. HUNT, SMITHSONIAN INSTITUTION, WASHINGTON, D.C.; RICHARD L. JANTZ, UNIVERSITY OF TENNESSEE; GEORGE W. GILL, UNIVERSITY OF WYOMING

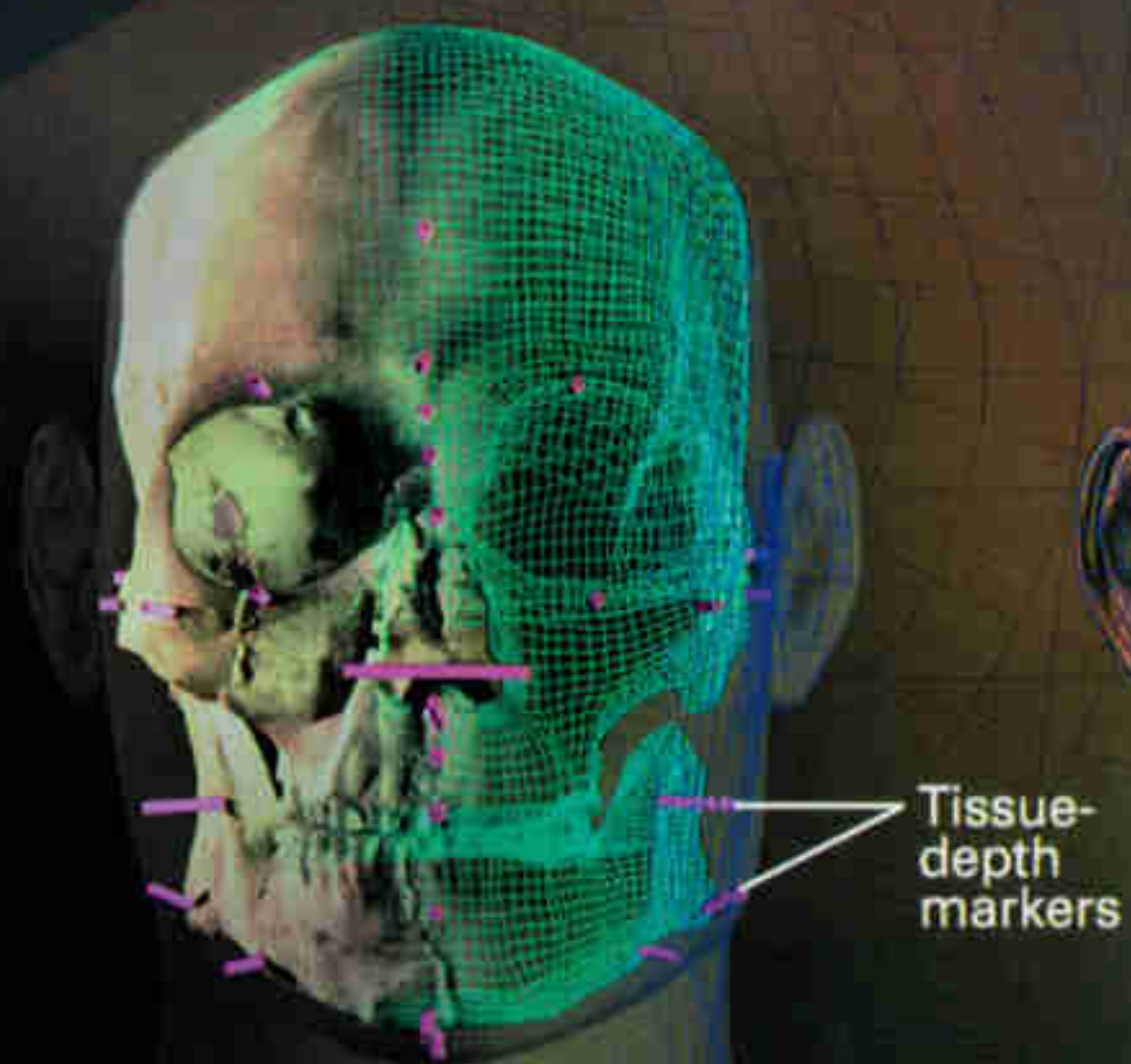
KENNEWICK MAN ART BY KEITH KASNOT; 3-D SCANNING BY ARIUS 3D; MODELING COURTESY ALIAS/WAVEFRONT AND DAMIEN FLEURY; SKULL CAST PROVIDED BY JAMES C. CHATTERS

SKULLS PHOTOGRAPHS BY CHIP CLARK; SKULLS AND SKULL CASTS COURTESY SMITHSONIAN NATIONAL MUSEUM OF NATURAL HISTORY, WASHINGTON, D.C. (UPPER CAVE CAST, MONGOLIAN AND AMERICAN INDIAN SKULLS); NEVADA STATE MUSEUM, CARSON CITY, AND SHARON LONG (SPIRIT CAVE CAST); JAMES C. CHATTERS (KENNEWICK CAST); AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK, N.Y. (AINU SKULL); NATIONAL MUSEUM OF HEALTH AND MEDICINE, WASHINGTON, D.C. (EURO-AMERICAN SKULL)



Reconstructing Kennewick Man

The digital rendering of Kennewick Man's head began with a cast of the skull. A 3-D computer image was made, and a system of markers and mathematical formulas was used for the flesh, nose, and other shapes. Externals like skin tone and facial hair are based on Ainu features.



Step 1: Skull cast is scanned into computer.



Step 2: Skin model is made using tissue-depth markers.

California. A few human bones unearthed on Santa Rosa Island were recently dated to about 13,000 years ago. They're among the oldest human remains on the continent. Though they, like the bones in Alaska, are a bit younger than the earliest Clovis tools, they also prove that sometime after early Americans got here, they knew how to get around on the water.

But showing that people actually got here by boat is much harder. Sea levels at the end of the last ice age were about 300 feet lower than today, so coastal camps would now be deep underwater. In 1998 two Canadian scientists seeking such camps off the Queen Charlotte Islands dredged up a stone tool. The tool, a volcanic rock flaked into what may have been a knife, came from 175 feet down, near where the shoreline would have been 11,500 years ago.

When I visited the scientists on a research vessel the following year, they discovered a pine tree stump in place at 475 feet, about the same depth as an even older shoreline, proving that sea levels were low and that people could have been there. But they found no more tools. And that one tool, which could have fallen out of a kayak a few thousand years ago, doesn't prove an early occupation. So the evidence on the west coast remains exciting but inconclusive.

ON THE EAST COAST there's another tantalizing—but untested—theory of a route that people could have taken to the Americas, with similarly thin but intriguing evidence.

The idea, suggested several times in the past century, has recently been revived by

11,000 YEARS AGO

ARCH LAKE, NEW MEXICO Scientists from the Smithsonian Institution and Eastern New Mexico University examine a woman's skeleton excavated along with its bed of sand in 1967. Preliminary dating suggests the skeleton is more than 11,000 years old. "She is the ultimate elder," says Doug Owsley, front row, at left. "We can learn from the secrets she can tell."



Dennis Stanford of the Smithsonian and archaeologist Bruce Bradley. The idea throws even the assumption of Asian origin into question: It says the Clovis people may have come not across Beringia but across the Atlantic.

Artifacts developed by a southwestern European culture called Solutrean are sometimes strikingly similar to Clovis tools, Stanford says. To him there's a stronger connection from America to the European tools, which date from about 20,000 years ago, than to tools of a similar age across the Pacific.

"The Asian projectiles are narrow and thick," he said. "Clovis and Solutrean are wider, flatter, thinner. Not everything in Solutrean is found in Clovis, but everything in Clovis is found in Solutrean."

The two archaeologists suggest that 18,000 to 24,000 years ago Solutrean people may have used watercraft similar to Eskimo skin boats to navigate all the way to North America.

Does this imply that the first Americans might have been blue-eyed white people, as racist groups sometimes suggest? No. Theories like this, archaeologists insist, offer no racial information at all. What we think of as racial characteristics, like skin color, can change rapidly as humans mingle and move.

"It's not racial," says Stanford. "It's a matter of technologies. We have no idea what race they were."

Solutrean tools faded away from Europe about 19,000 years ago because the people either left or changed their technology. But Stanford thinks that sites like Cactus Hill, whose dates appear to go almost that far back, may contain Solutrean remains.

"We're just getting started on this," Stanford said. "We're going to have a lot of bright graduate students trying to prove we're wrong. And even if we're wrong, we'll know a lot more about both Clovis and Solutrean, and that's worth it. I've been wrong before, and it's sure gotten people's attention."

Some of the archaeologists I've asked about this theory scoff at it. Loudly.

To Lawrence Guy Straus, an expert on the Solutrean culture, the distance from Spain to America and the 5,000-year time difference between the Solutrean disappearance and the generally accepted dates for Clovis make the theory impossible. "Sorry," he said. He added that there's no evidence that the Solutrean

culture included navigation, deep-sea fishing, or marine-mammal hunting.

And Straus had no sympathy for Stanford's idea of tool similarities.

"One of the great failings of archaeology," he told me, "is a continuous falling back on the notion that if a couple of things resemble one another, they have to have the same source. But these similarities appear and reappear time and again in different places."

Michael Collins, an archaeologist working at the Gault site in Texas, a prime Clovis site, was more intrigued. To Collins the many similarities with Solutrean tools shouldn't be ignored.

"There's enough smoke there that someone had better start looking for the fire," he said.

Now where they came in the south, the land was barren, and food and water were not plentiful. So the Great Power taught the red people to hunt and to make clothes to cover themselves against the cold, and they had a pretty good life there.

—CHEYENNE CREATION STORY

When and how people got here are only two parts of the puzzle. A third piece, which is just as uncertain in today's climate of questioning, is who the first Americans were. Some of the evidence is based on skulls.

In Rio de Janeiro I went to a museum housed in a former palace to see a famous skull called Luzia (page 65). It was stored in a cardboard box. When the skull was brought out, it looked small as a child's face.

Luzia was found about 25 years ago near Belo Horizonte, north of Rio, in a site dated at around 13,500 years. Recently there was a dramatic development: A new analysis of the shape of the skull indicated that she didn't look much like an American Indian. Just who she did look like was another matter. The new research focused attention on the views of Brazilian scientist Walter Neves, who claims that her skull shape is more like those of people from Africa or the South Pacific than like modern Indians. He suggests that she might have descended from Asians who may also be ancestors of the original Australians.

The problem with early skulls, though, is that they have led to very loud conclusions based on very slender evidence.

In the United States one counterpart to Luzia is a 9,500-year-old skeleton known as



**13,000 YEARS AGO
THE AMERICAN WEST** "Bison were conspicuous," says archaeologist James Adovasio, "but by no means the focal point of the economy." Details of early lives, revealed by woven sandals (below) up to 13,000 years old and a tattooing tool (right), show a complex lifestyle built on many resources. "Stone is only 5 percent of what they were using," Adovasio says, "but the rest is normally not preserved."





Kennewick Man, which was found in Washington State in 1996. The skeleton has been locked away from most research during a legal fight that developed because five Indian tribes believe they have the right to claim and bury Kennewick Man, while a group of scientists think the ancient bones should be studied.

Early newspaper reports suggested the skull looked like that of a white man, because archaeologist Jim Chatters used the term “Caucasoid”—a technical description of skull shape that indicates a difference from Mongoloid but doesn’t mean Caucasian. All Chatters meant in his initial reports was that the skull, in a modern context, would not have been identified as Indian. But what the skull means to prehistory is still unknown.

For scientists, attributing race to an ancient skull is misguided, in part because race isn’t a scientific way to categorize human beings, in part because the races we identify today

probably didn’t exist 9,500 years ago. After initial reports attached a race to Kennewick Man, Chatters tried hard to quell the flood of racial speculation. “Nobody’s talking about white here,” he said.

The classification of humans by skull type has an ugly history, including efforts by the eugenics movement to reinforce racial stereotypes with studies based on skull measurements. Because of this and because skull shapes can be influenced by things like diet, many archaeologists hesitate to draw conclusions. But the bones of Luzia, Kennewick Man, and a few other ancient skeletons are part of a very small amount of evidence about who early Americans actually were, so physical anthropologists are trying to learn what they can from them.

“When you study these early skeletons,” said Doug Owsley, a physical anthropologist from the Smithsonian Institution, “they do not





have as wide a facial breadth as modern Native Americans and are not as heavily built in the face, and they have a longer, narrower cranial vault.”

This doesn’t necessarily tell you who came from where. “One skull doesn’t mean anything,” one archaeologist told me. “Look at all the different shapes of the heads of spectators in one football stadium.” Such skepticism about skulls is in part based on a study by Franz Boas, one of the giants of the discipline, who reported in 1911 that the children of immigrants in New York City had significantly different head shapes from their parents.

To get around these concerns, Owsley and Richard Jantz, another physical anthropologist, are collecting abundant statistics. If large numbers of skeletal measurements show that certain groups from one place differ consistently from groups that came from

somewhere else, then it may eventually be possible to be more confident about the origin of Kennewick Man.

But that time isn’t yet here. Owsley will only offer hints. To him the early skulls tend to look a little like the ancestors of modern Polynesians or of the Ainu of Japan, who are a remnant of a people who once roamed widely in coastal Asia and had a maritime culture. Both of those sources would fit well with theories of arrival across the land bridge or by boat along the Pacific Rim. But because the bones are so varied, the story they tell Owsley so far isn’t about a single invasion but of a gradual accumulation of peoples.

“This would be consistent with multiple waves happening over time,” he said. “And you cannot at this time rule out people coming across the Atlantic. It would be a rich, complicated story.”



10,500 YEARS AGO PATAGONIA

Paintings on the walls of Cueva de las Manos (“cave of the hands”) in Patagonia show that the human desire to be remembered goes back at least 10,500 years. The animals are guanacos, relatives of the llama, which still roam the Patagonian desert. Spray-painted hands, possibly made by blowing paint through a bird-bone tube, are also seen in Australia and France. Scientists think this shows how different people invent similar things. The skull of a young woman found in Brazil (right), dated at 13,500 years, also confuses the story of where Americans came from. Her skull looks more African or Aboriginal Australian than Native American.

stories told by skulls. Though early skulls like Kennewick Man show some similarities to the Ainu, studies conducted in Japan have turned up almost no DNA links with early Americans. Most DNA data, in fact, lead in a different direction.

“From the point of view of mitochondrial DNA,” said David Glenn Smith, an anthropologist at the University of California at Davis, “the best bet for the origin is the Lake Baikal area of Russia.” I talked to Smith in a small office next to the lab where he analyzes DNA samples. On his wall was a map of the United States with gold stars marking places where some of the 40 oldest skeletons have been found. He has been collecting samples of



IF THE STUDY OF STONES and bones often seems subjective, the study of DNA looks far more like hard science. After all, you can convict criminals on the basis of DNA, so why can't you track the first Americans?

So far DNA analysis hasn't brought the clear-cut answers everyone is hoping for. DNA studies that follow characteristic markers through mothers' genes have supported in very general terms the idea that North Americans arrived from Asia. These markers don't give simple answers, however. For instance, one of the markers in Native American genes shows up in modern genes from Europe and Central Asia, but not from Siberia, indicating either that people who carried it died out in Siberia after the migration to America or that Stanford's idea of a move directly from Europe might have some genetic backing.

DNA evidence can also conflict with the

some of the bones and is conducting a major study of their DNA.

“We want to find out if there's any evidence that early people look different from later people,” Smith said. “If their skulls differ, there's cause to ask if they also look genetically different.” So far, though he is busy asking the question, he has released no formal answers.

In the beginning water was everywhere, and the question was asked, “Who will make land?”

Crawfish dove down to the bottom and found mud there. —YUCHI-CREEK CREATION STORY

All this uncertainty obscures another part of the story of the first Americans: How wonderful it is to have even a tiny glimpse of those ancient lives.

At the bottom of the shallow Wacissa River in northern Florida, two scuba divers worked

with trowels in the silt. Just like archaeologists excavating on solid ground, they dug carefully but intently at layers of sediment about four feet down, teasing bits of stone, bone, and ivory from their nests in time.

“Because of the good preservation our forte is bone and ivory tools,” said David Webb, curator of vertebrate paleontology at the Florida Museum of Natural History at the University of Florida. A lean, energetic, white-haired man who waved his arms as he talked, he showed me some of the tools found in Florida rivers. There were marvelous spear tips of mastodon ivory up to 13 inches long, projectile points, and even two large, dagger-shaped tools with holes drilled in their handles made from the bones of now extinct Pleistocene horses.

Though carbon dates on several tools and on animal bones with butchering marks indicate that humans may have been there 14,000 years ago, the tools give little information about where these people came from. And Webb is cautious about concluding that the dates really mean people were here before the 13,500-year Clovis limit.

“I don’t want to take sides,” he said with a huge grin.

Out by the river I talked to Andy Hemmings, a doctoral candidate in anthropology. Hemmings is young and passionate and wears his hair standing on end in a Mohawk that makes him look both startled and extraordinarily alert. He had made a copy of one of the daggers from a modern horse bone, grinding it on concrete for hours until it looked right, then drilling a hole in the handle with a piece of stone. He didn’t drill the hole right, so it was off-center. But when he looked at the original, he saw that its carver had made the same mistake.

What he felt then is one of the things that drives people into archaeology. As sharply as the flash of an electrical short, the shared mistake connected his imagination to a single other human being in the past.

“That’s the real slice of life when you’re sitting there and that happens,” he said. “Maybe it’s my intellectual curiosity and my sympathetic yearnings. You kind of see something.”

What he saw—a face in the distance of time—reminded me that the human connection we make across the years is the force that

8,300 YEARS AGO TIERRA DEL FUEGO

Only 90 miles from Cape Horn, a group of harpoons, bird-bone awls, and tubular beads grace the shoreline of one of the last places colonized by humans—about 8,300 years ago. To Argentinian archaeologist José Luis Lanata these tools point to the many abilities people brought to this diverse and difficult hemisphere.

“There is a misconception that people needed hundreds of years to adapt to an environment,” he says. “But people survived in the Americas because they could cope with risky situations at any moment. Human fitness is more dynamic than all of us think.”



makes us search for the most honest story of those ancient lives we can find.

Léxuwakipa, who was very touchy, felt offended by the people. In revenge she let it snow so much that an enormous mass of ice came to cover the entire Earth. When it eventually began to melt, there was so much water that the Earth became completely flooded.

—YÁMANA CREATION STORY

On a beach in Tierra del Fuego stood a small hut made of the branches of Antarctic beech trees. It is a copy of the huts once used by Yámana Indians, who lived here when the first European explorers came but are now almost gone. A cold wind blew up from Cape Horn and rattled the dry leaves on the branches of the hut. I climbed into the hut and tried to imagine the past.



This was the end of the Earth—one of the last places people came to live. The record so far shows they arrived at this southern tip of Tierra del Fuego only about 8,300 years ago.

The stories here are just as confusing as elsewhere in the Americas. When explorers from Europe arrived, four separate peoples inhabited this relatively small landscape. Each group looked different from the others, and they spoke two different languages. The Argentinian archaeologist who brought me here, José Luis Lanata, described the question of how all these different groups got here as “a puzzle of many combinations.”

You can apply that phrase to the whole story of the first Americans. What will it take to solve the puzzle? Today the study of early Americans stands at a moment of scientific turmoil: Established theories are shaken to their roots, and new ideas are stacked all over

the place—ideas about boats from Asia, boats from Spain, arrival 30,000 years ago, arrival 13,500 years ago. Realistic scientists don’t see much resolution soon. Speculation is abundant, but the basic raw material of science—real, conclusive evidence itself—is very hard to find.

“We need a series of pre-Clovis sites,” one archaeologist told me. “We need four or five in a row. Maybe in the next century or two we’ll get some.”

José Luis Lanata agreed it’s going to be a long time before the puzzle is solved.

“The debate about the first Americans,” Lanata concluded, “could break the nerves of the most patient man in the world.” □

MORE ON OUR WEBSITE

See video from Cactus Hill, one of the oldest archaeological sites in North America, at nationalgeographic.com/ngm/0012.



A SPECIAL PLACE

FIORD

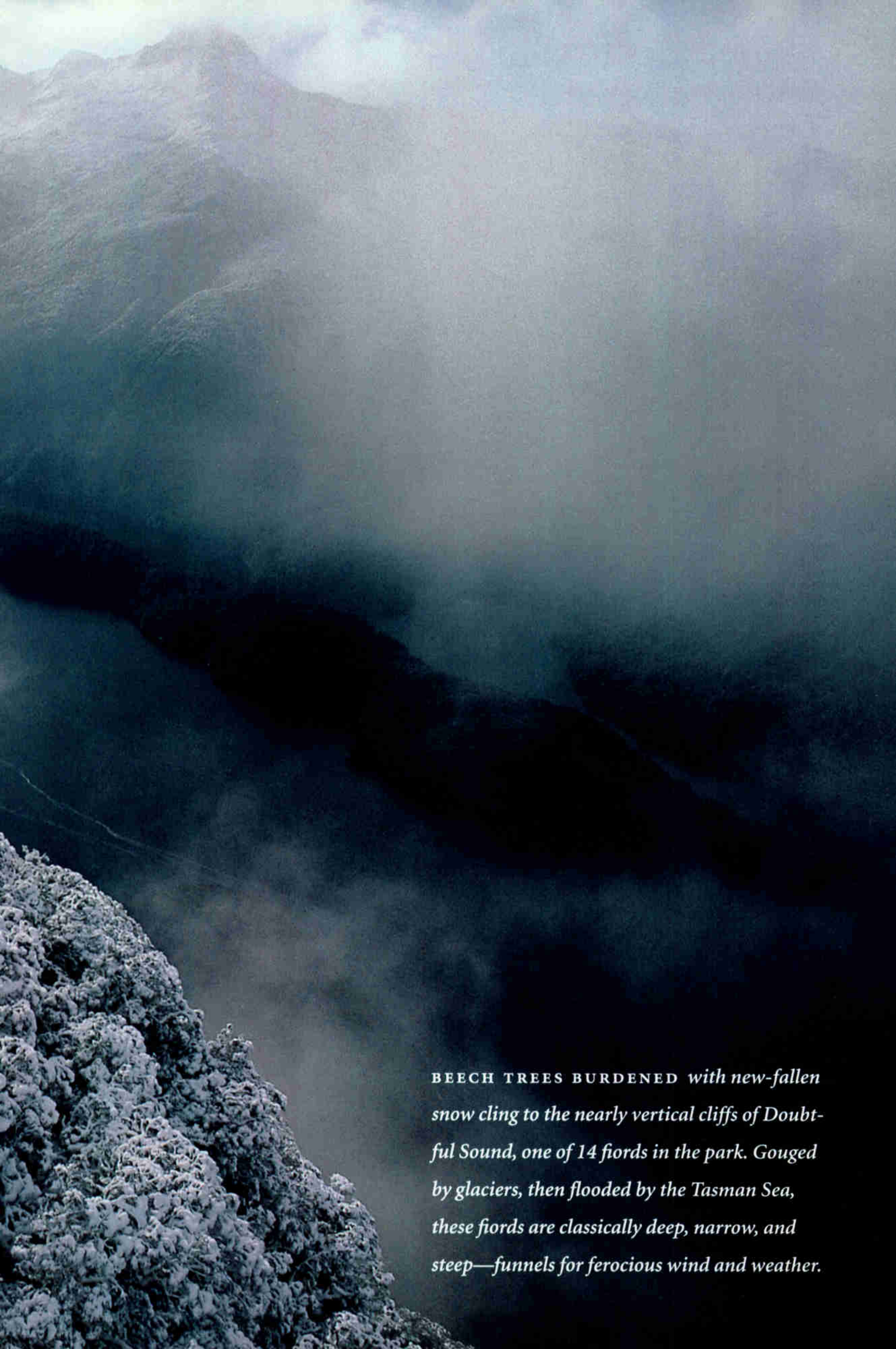
BY KENNEDY WARNE PHOTOGRAPHS BY ANNIE GRIFFITHS BELT

GLIDING WITH UNCANNY GRACE, *bottle-nose dolphins pass the scalloped shadow of a mountain peak in Fiordland, New Zealand's largest national park. Fiordland's dolphins may spend their entire lives in a single fiord—denizens of an isolated world as dramatic above water as it is below.*

LAND

New Zealand's Southern Sanctuary





BEECH TREES BURDENED *with new-fallen snow cling to the nearly vertical cliffs of Doubtful Sound, one of 14 fiords in the park. Gouged by glaciers, then flooded by the Tasman Sea, these fiords are classically deep, narrow, and steep—funnels for ferocious wind and weather.*

STORM CLOUDS HAVE CLAMPED down hard on the Darran Mountains, and in the Hollyford Valley the forest is misty and dark. A confetti of beech leaves drifts from the canopy, splashing the path with red and gold. Tresses of moss, beaded with raindrops, trail from every branch. I am on the track to Lake Marian, one of hundreds of lakes that dot the map of Fiordland National Park like blue tears. Beyond the mountains, which rise in Himalayan profusion in this northern part of the park, lie the Tasman Sea and the fiords—14 jagged knife cuts in the coastline that give the region its name.

With the cowl of my rain jacket pulled over my head, I feel like a monk on his way to vespers in a living cathedral. A tree fuchsia beside the path gently sheds its magenta blossoms. At its foot, where the ground is dry, I pick up paper-thin peelings of orange bark. A South Island robin, elegant in smoky gray, hops onto the path on matchstick legs and cocks her head in my direction. Fern fronds lift their clenched tips like little fists. Maori steam and eat these young *koru*. I pop one into my mouth. It has a peppery tang, not unpleasant.

The track snakes around trees, dips beneath toppled trunks, crosses streams. Sometimes the trail is the streambed itself, or a set of steps chainsawed into a log, or a couple of stout tree ferns tossed across a mire. Most of Fiordland's 300 miles of walking paths are like this one: soft on the sole and close to nature. Often they are just a more trodden version of the forest floor, twisting threads in a rich carpet of yellows, browns, and greens. Especially greens. From mosses that form verdant cushions on rock and tree root to streams that glow liquid emerald in the sun, this place is an extravagance of greenness. In 1990, when Fiordland and several nearby reserves were listed as a United Nations World Heritage site, the area's most treasured mineral resource was chosen for its name: Te Wahipounamu, "the place of greenstone."

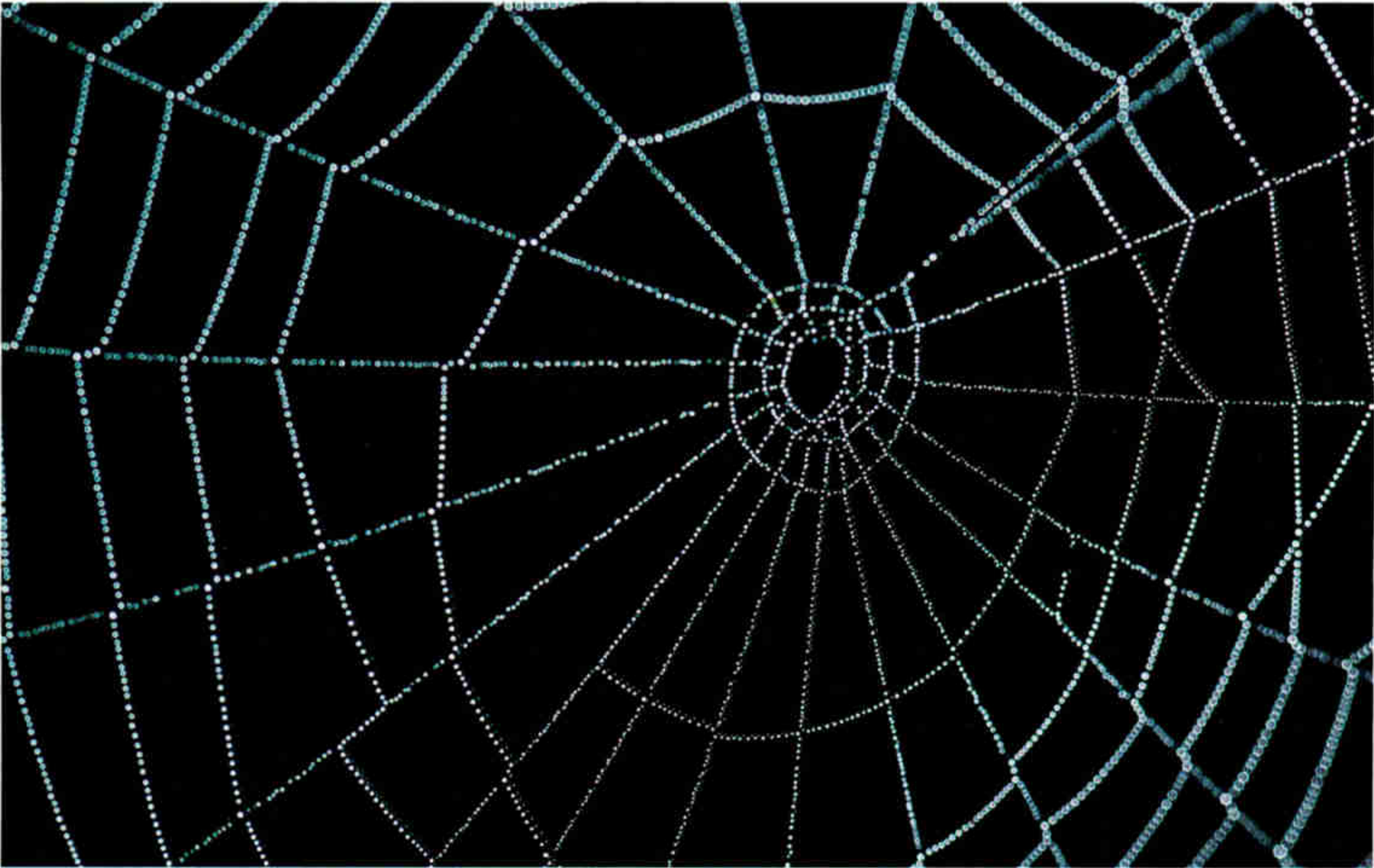
In Maori mythology the South Island is the canoe from which a mighty ancestor, Maui, hauled the fish-shaped North Island out of the sea. Scientists, too, use a nautical image to describe the history of these islands: an 80-million-year geologic voyage through the Pacific Ocean.

Fiordland's landforms tell the story of that journey, and because this region abuts one of Earth's most active tectonic boundaries, where two crustal plates scrummage against each other, the outcome is dramatic. Fiordland has been twisted, buckled, and tilted. It has been buried beneath ocean sediments for millions of years, then thrust above the waves for wind, sun, and ice to carve and erode. It has been fragmented by faults, rocked by earthquakes, and frozen by ice caps up to a mile thick.

The earthworks continue. Today the mile-high razorbacks of Fiordland and, to the north, the soaring peaks of the Southern Alps are being pushed upward as much as half an inch a year. Were it not for erosion, some of these peaks would be 15 miles high. And although most of the

Frost warmed by the sun liquefies, leaving grasses and a web bejeweled. Water defines Fiordland, one of Earth's wettest regions. Moisture-laden air caught by mountains and cooled as it rises drops some 21 feet of rain a year in the west. Slopes lush with ferns and mosses sprout ephemeral waterfalls that gush into fiords, leaving a freshwater layer as deep as 30 feet on the sea's surface.

SCALE, THAT SATURATES THE MIND.



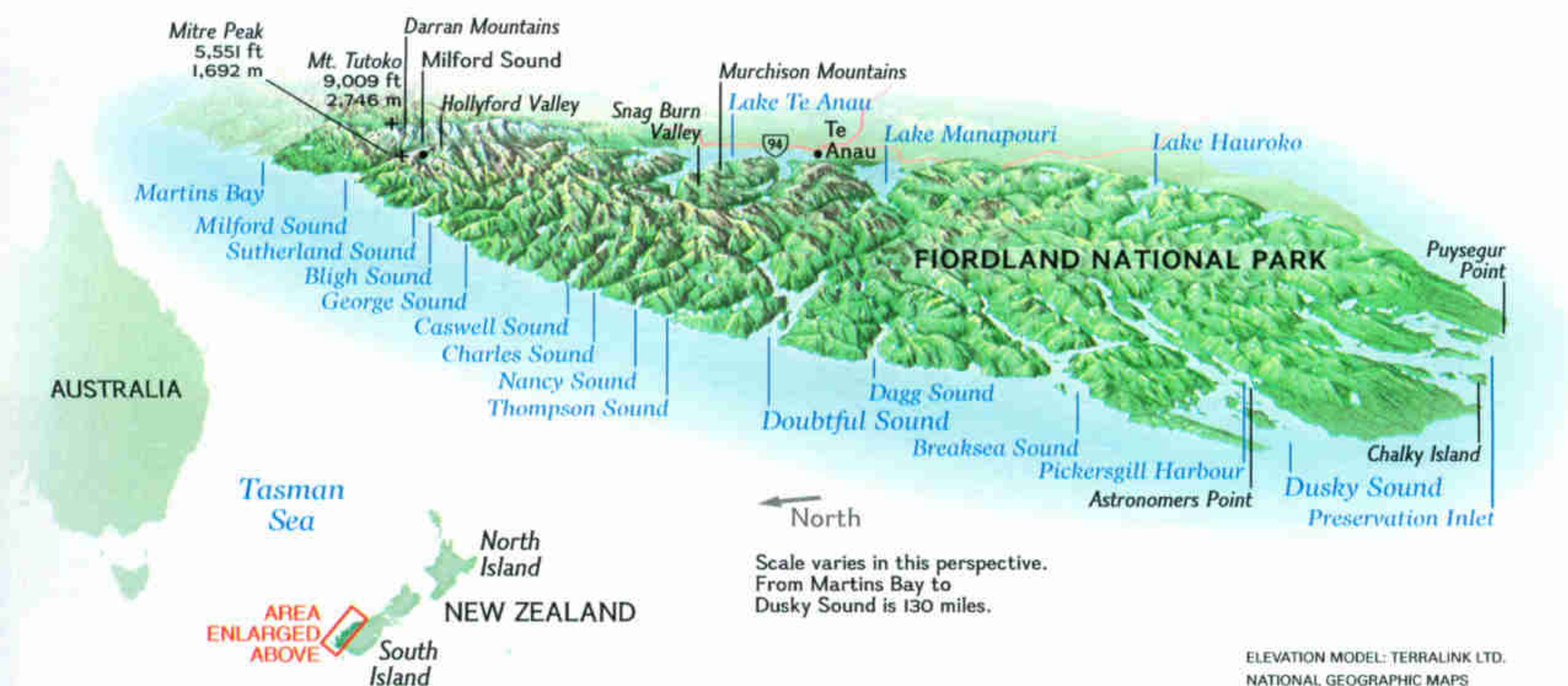
glaciers in Fiordland melted at the end of the last ice age, scattered ice flows continue to scour the high places.

Lake Marian herself is an ice child. I pick my way along a shore of boulders plucked from the mountains and tumbled by the glacier that hollowed out the lake bed. Across the water, clouds swirl about like gauzy curtains, hiding, then revealing, the wooded slopes. Fiordland seems in every sense a work in progress, Earth's unfinished symphony.

Out of a geologic maelstrom strange and wonderful plants and animals have emerged, including several hundred species found only within the park boundaries. Other species, which once enjoyed wide distribution across New Zealand, now cling to survival only in Fiordland. The most celebrated example is the takahe, the world's largest rail, a goose-size bird that was considered extinct for 50 years until deer hunters found a pair in the Murchison Mountains in 1948. It turned out that several hundred takahe were holed up virtually within sight of the town of Te Anau, Fiordland's gateway.

A sandy spit at Martins Bay seems a short trek but a world away from the snowcapped peaks beyond, which top 9,000 feet. Spanning 3.1 million acres, Fiordland ranges from windswept glaciers to a coastline pummeled by the Tasman Sea.





From the air it is not hard to see how a species could be overlooked in such a hinterland. The helicopter taking Rod Morris, a documentary filmmaker, and me up the Snag Burn Valley into takahe country feels no bigger than a gnat, which a sudden gust could swat against the granite walls that surround us. The ramparts disappear into cloud, and freshly charged waterfalls tumble down their faces.


Morris points to the head of the valley. “Takahe go up and over those bluffs,” he shouts above the engine. “Not bad for a flightless bird, eh?”

Morris first came here in 1973, one of a dozen wildlife-service recruits who searched the 200 square miles of the Murchisons for takahe. “We lived off venison and rolled oats, and we got so fit we could scramble up the cliffs like chamois,” says Morris as we boil the billy in the Snag Burn hut. “Our job was to find the birds, map their territories, figure out how many eggs they were laying and what the survival rates were. It was a three-year project, and out of it came a recovery plan for the species.”

We find the Snag’s resident pair of takahe feeding by a stream. They are beautiful birds—an oil painter’s dream—with plumage ranging from olive through iridescent blue to licks of chocolate brown, cherry pink legs, and a snowy white undertail. We watch as they yank clumps of tussock grass out of the ground with their great red bolt cutters of beaks, then clip off the juicy stalks to extract some meager goodness.

It’s a hard life for a grazing bird here, where snow blankets the flats in winter. Despite a captive breeding program, the Murchison population is barely holding its own at 130 birds. The problem for takahe—and for countless other native species—is predatory mammals, all introduced by accident or through misguided intention by settlers. Before people arrived, reptiles and birds were New Zealand’s dominant vertebrates. Mammals overturned that old order. Against sharp-toothed rodents, stoats, weasels, and feral cats, New Zealand’s flightless birds—along with giant insects and snails, frogs, lizards, and tuatara—are helpless.

As we watch the takahe, the male starts chasing the female round and round a sapling, stumpy wings lifted and white undertail fluffed. The courtship display is short-lived. He gives a soft *harrumph*, then gets back



CROOKED AS A CRONE'S finger, a branch beckons hikers on the Hollyford Track, one of many famous Fiordland walks. "It's like being in a fairy tale," says one hiker. Trails lush with ferns and mosses evoke author J. R. R. Tolkien's mythical forests, where "shadows lay by night and day, and dark things silent crept beneath."



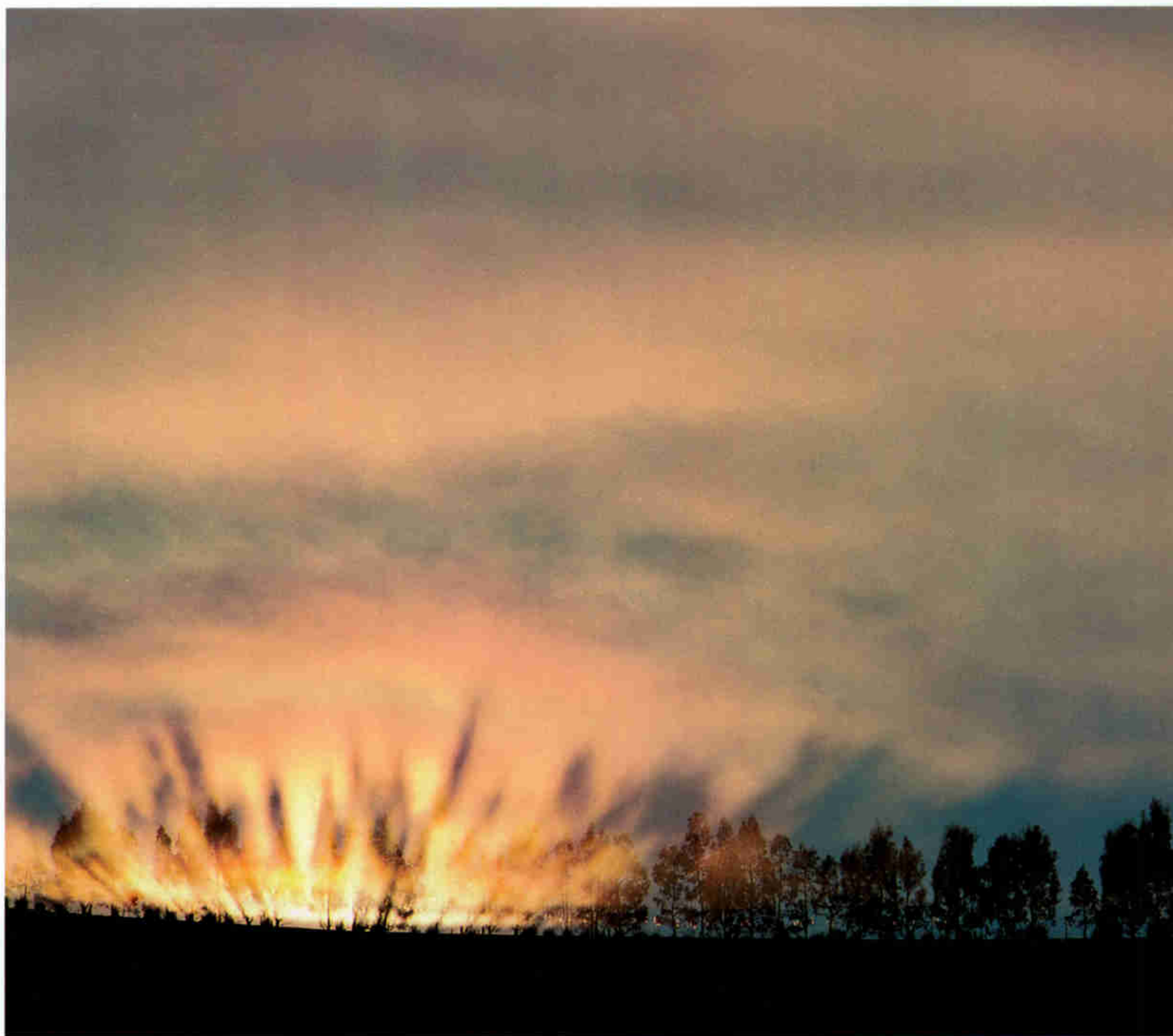
CLOUDS SWIRL ABOUT LIKE GAUZY CURTAINS,

to feeding. Both birds occasionally stop to scratch sand flies out of their eyes with their toes, their metal identification anklets jangling.

Every paradise has its price, and in Fiordland it takes the form of a blood tribute extracted by hordes of these biting insects. Maori legend says that Hinenui-te-po, goddess of the underworld, created the sand fly to keep humans from becoming idle in the face of Fiordland's stunning beauty. She succeeded. When visiting Fiordland, the rule is: Keep moving, and carry a big can of bug repellent.

After dark, when, mercifully, the sand flies go off duty, Morris and I head into the forest to conduct an impromptu survey of Fiordland's nightlife. By lantern and flashlight we scan the moss-covered trunks of the trees. A native cockroach, gleaming like varnished mahogany, pauses, antennae twitching. Shiny black pill bugs roll into balls but do not fall from their mossy perches.

We run the lantern along fallen logs, admiring the forest in miniature: coconut-palm mosses towering above crumpled crusts of salmon and



HIDING, THEN REVEALING, THE WOODED SLOPES.

Tree shadows streak
morning fog east of
Fiordland, near Lake
Te Anau. Te Anau,
Manapouri, Hauroko
—these glacial lakes
have names born
of the Maori, Poly-
nesians who settled
this country known
as the Land of the
Long White Cloud.



lime lichen; beech seedlings sprouting among filmy ferns; spores held aloft on spires and nestled in bright orange cups—the moist, luscious abundance of the forest carpet.

We are especially looking for green invertebrates. In a place as prodigiously green as Fiordland, we expect many of the residents to have sought safety in camouflage. A crane fly—a gangly-legged insect that looks like an overgrown mosquito—careers into the lantern, then flits away. I make a wild swing and catch it. Aha! Its body is a ghostly green. Minutes later we find a green crab spider and a green daddy longlegs. We ruffle the dry moss beards that hang from beech branches, hoping to flush a green weta, a kind of nocturnal grasshopper, but have no luck.

Just after midnight we hear a kiwi—a shrill, rising cry with a guttural squawk at the end, repeated a dozen or more times. Silence. Then a second call, strong and challenging, from across the valley. “Males staking out their territories,” whispers Morris above the hiss of the lantern.

Maori call this species of kiwi *tokoea*, “bird with a walking stick”—an apt description of New Zealand’s long-beaked national symbol. Both the large brown *tokoea* and a smaller spotted kiwi were once common here. Now the little spotted kiwi has disappeared from Fiordland, and *tokoea* numbers are declining.

No species’ decline in Fiordland is felt more keenly by wildlife people than that of the kakapo, the world’s heaviest parrot, which, like the takahe and the kiwi, is flightless. With its plumage of moss green, yellow, and brown, the kakapo is so well camouflaged that you can be standing a few feet from one and not see it. But such cryptic mastery is no refuge from a mammal hunting by smell. “They smell like freesias,” says Morris. “It’s as if they’ve been sprayed with air freshener. You might as well put a sign around their necks saying ‘Dinner is served.’ Any stoat in the neighborhood is just going to roll around laughing before ripping its throat out.” These forests were once the kakapo’s stronghold, but now the bird Morris regards as the quintessence of Fiordland is confined to island sanctuaries far from here—reservations for the ecologically dispossessed.

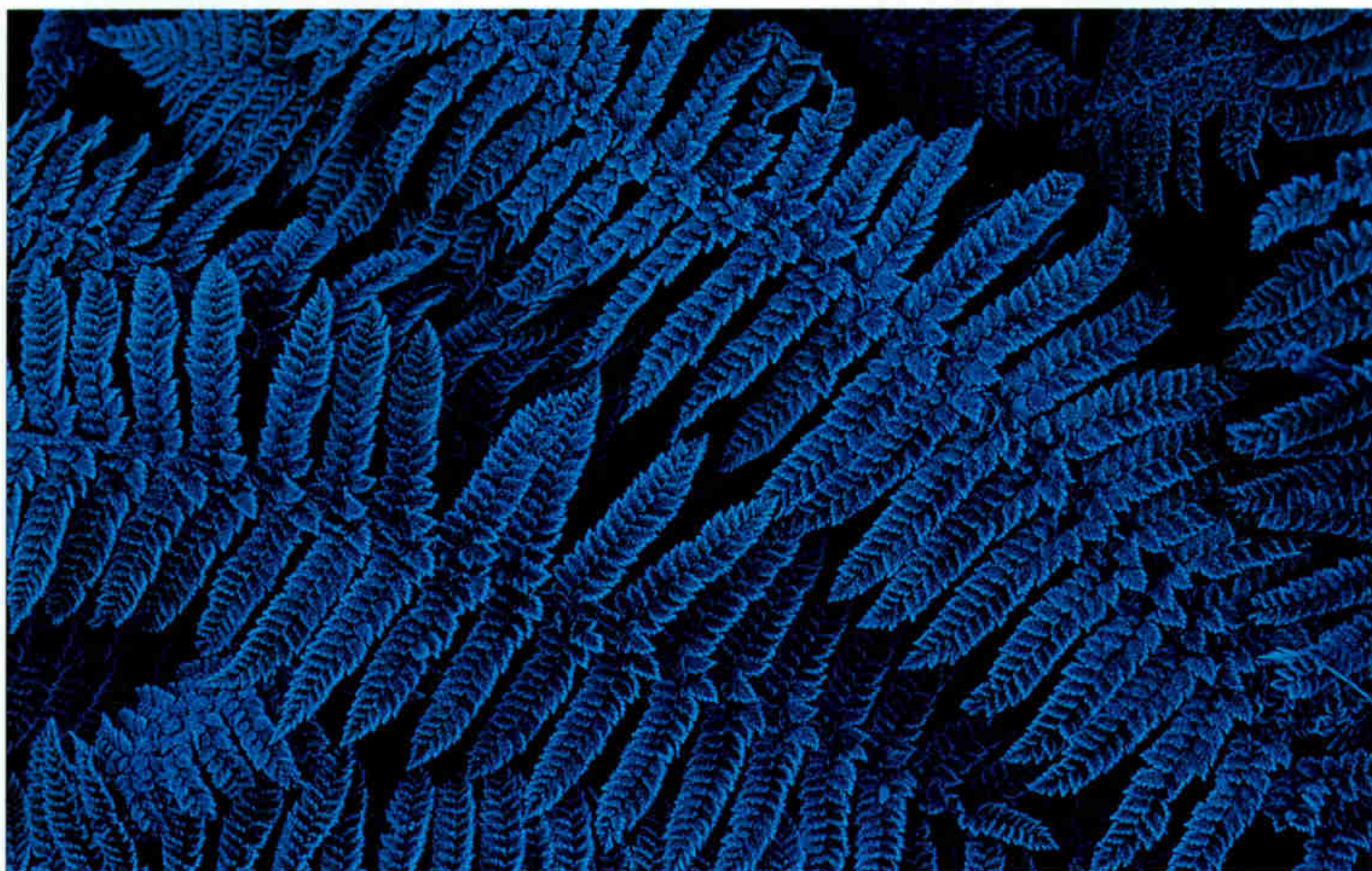
We don’t hear the kiwi again, only an owl’s doleful call: *morepork*, *morepork*. Otherwise, the forest is silent—the heavy silence of loss.

FIORDLAND’S CURVING COASTLINE and narrow fiords, with their multiple arms and countless islands and coves, beckon the explorer to leave the forests and put to sea. At Milford Sound, the northernmost fiord, I hitch a ride on the Department of Conservation’s boat, *Renown*. It is going south to Chalky Island, where conservation staff are eradicating stoats to create a new wildlife reserve.

At Milford’s commercial wharf—well hidden from the tourist jetties—fishing-boat crews are sorting gear and complaining about the lobster price. A forklift scoots about, delivering boxes of bait. Beyond stands Mitre Peak, Milford’s 5,551-foot craggy eminence. Sea kayakers slice the sea’s mirror blackness with their shiny craft.

When he saw Milford Sound for the first time, Donald Sutherland—sealer, soldier, gold prospector—declared, “If ever I come to anchor it will be here.” He kept his word and in 1878 built three thatched huts,

WE DON'T HEAR THE KIWI AGAIN. THE FOREST IS



A brilliant flash of kea feathers and the monochrome grace of a frosted fern suggest the subtler beauties of a tranquil land. Yet it's a land whose endemic birds and plants are under siege by stoats, deer, possums, and other alien species introduced by European settlers. Hunting and trapping help curb these invaders. As for the bumptious kea, this high-mountain parrot still thrives.

which he called the City of Milford. A dozen years later, when a walking track was put through between Te Anau and Milford, Sutherland's wife, Elizabeth, opened a boarding house for "asphalters"—cityfolk who came to partake of Fiordland's grandeur. Still they come—350,000 a year—some crossing the mountains on the famous Milford Track, most in buses on Fiordland's only paved road. The day-trippers take a cruise and maybe a scenic flight, then rejoin the cavalcade back to Te Anau.

There is a stiff breeze today in the outer fiord, flaying the waterfalls that plunge down the sea cliffs, but once we clear the entrance it dies away to barely a puff, and we steam south on an oily swell. Albatrosses soar in endless lazy arcs. Headlands slide past, each with the same rumpled forest cover, as if an old green blanket had been thrown across them. The fiords, like crooked fingers pointing inland, hide their entrances in sea haze. I tick them off as we pass: Sutherland Sound, Bligh Sound, George, Caswell, Charles, Nancy, Thompson, Doubtful.

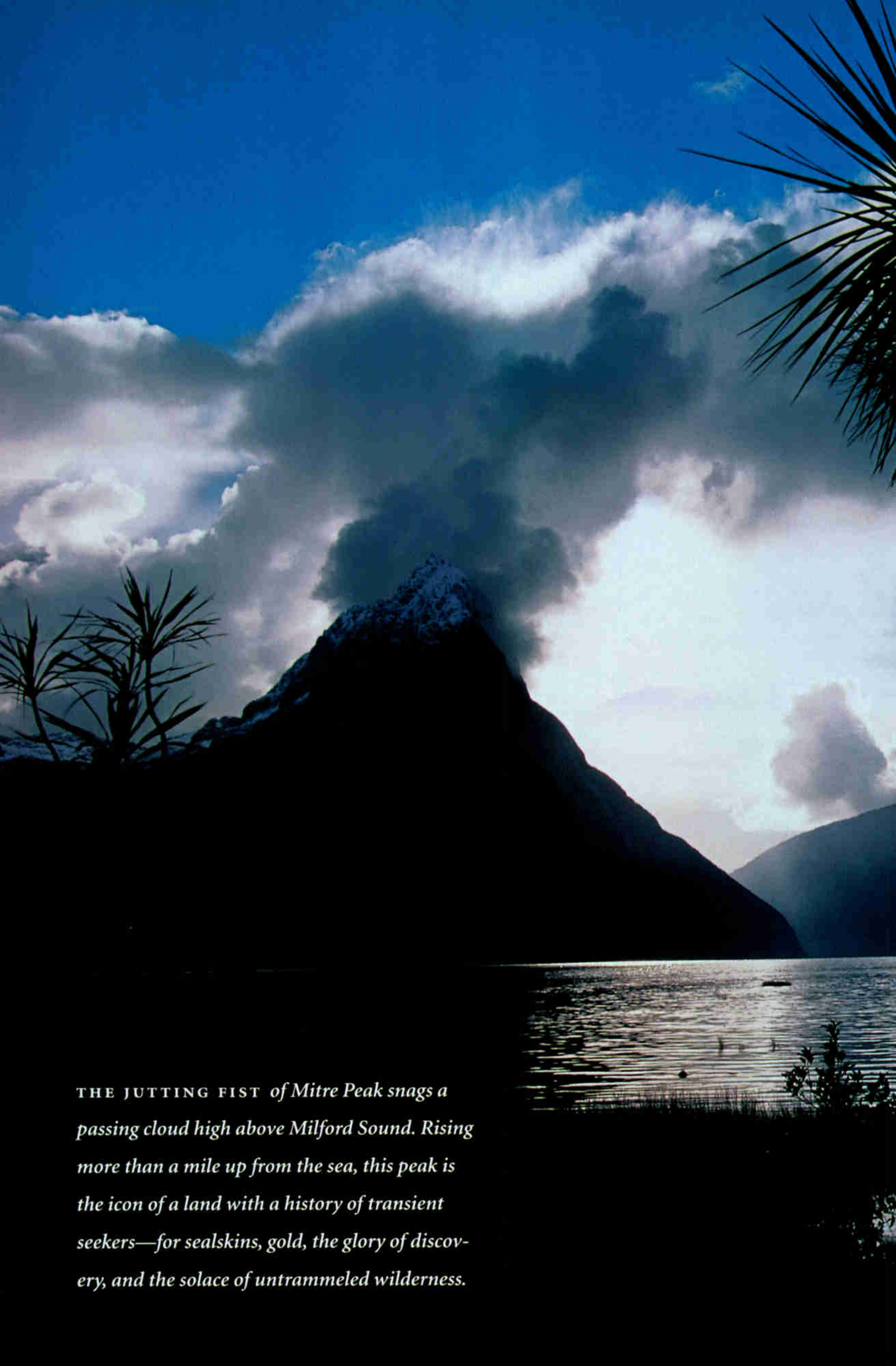
In Maori mythology the fiords are the workmanship not of brawny rivers of ice but of an adze-wielding superman, Tu-te-raki-whanoa, who sliced indentations into the wave-battered coastline to make it habitable. But habitation has always been thin. Maori made seasonal visits to hunt and fish and to collect *tangiwai*, a type of greenstone, from Milford Sound, and from time to time vanquished tribal groups found sanctuary here, living the lonely life of refugees amid the seals and penguins.

JAMES COOK was the first European to explore Fiordland. After his epic crossing of the Southern Ocean in 1773 in search of a great southern continent, Cook spent five weeks in Dusky Sound, mooring his ship, *Resolution*, in Pickersgill Harbour near the southern entrance of the fiord. Outwardly little has changed since Cook's day. Here is the "murmuring rivulet" that supplied his fresh water; there the stands of rimu (Cook likened them to spruce) from which he brewed beer to stave off scurvy among his crew. A tree limb leans out over the water in almost the exact position as the one he used for a gangplank. On Astronomers Point the stumps of trees felled so that an observatory could be set up are still visible, crumbling under a cloak of kidney fern.

In sheltered coves around the seaward islands fur seal pups drowse on little grass-topped islets. Slaughtered for their pelts in the years following Cook's voyage, Fiordland's fur seals dwindled nearly to the point of extinction but are now on the increase—one of the few native species to post a positive result on Fiordland's balance sheet. The pups raise their heads and fix their lachrymose eyes on us as *Renown* passes.

Compared with the steep-walled northern fiords, Dusky Sound has a gentler, more curvaceous aspect. The mountains are lower, and the glacial ice flowed over their tops, leaving blunt-ridged peninsulas and muffin-shaped islands—one for every day of the year, some say. Each is thickly forested almost to the waterline. Such luxuriant growth, often on a scant six to eight inches of soil, is possible only because of Fiordland's exceptional rainfall. In Milford Sound it averages 254 inches a year, and in wet years that can rise to 360. "Fiordland is hydroponic gardening on a grand scale," one park ranger told me.

Sometimes the "garden" witnesses spectacular casualties. After an



THE JUTTING FIST of Mitre Peak snags a passing cloud high above Milford Sound. Rising more than a mile up from the sea, this peak is the icon of a land with a history of transient seekers—for sealskins, gold, the glory of discovery, and the solace of untrammelled wilderness.

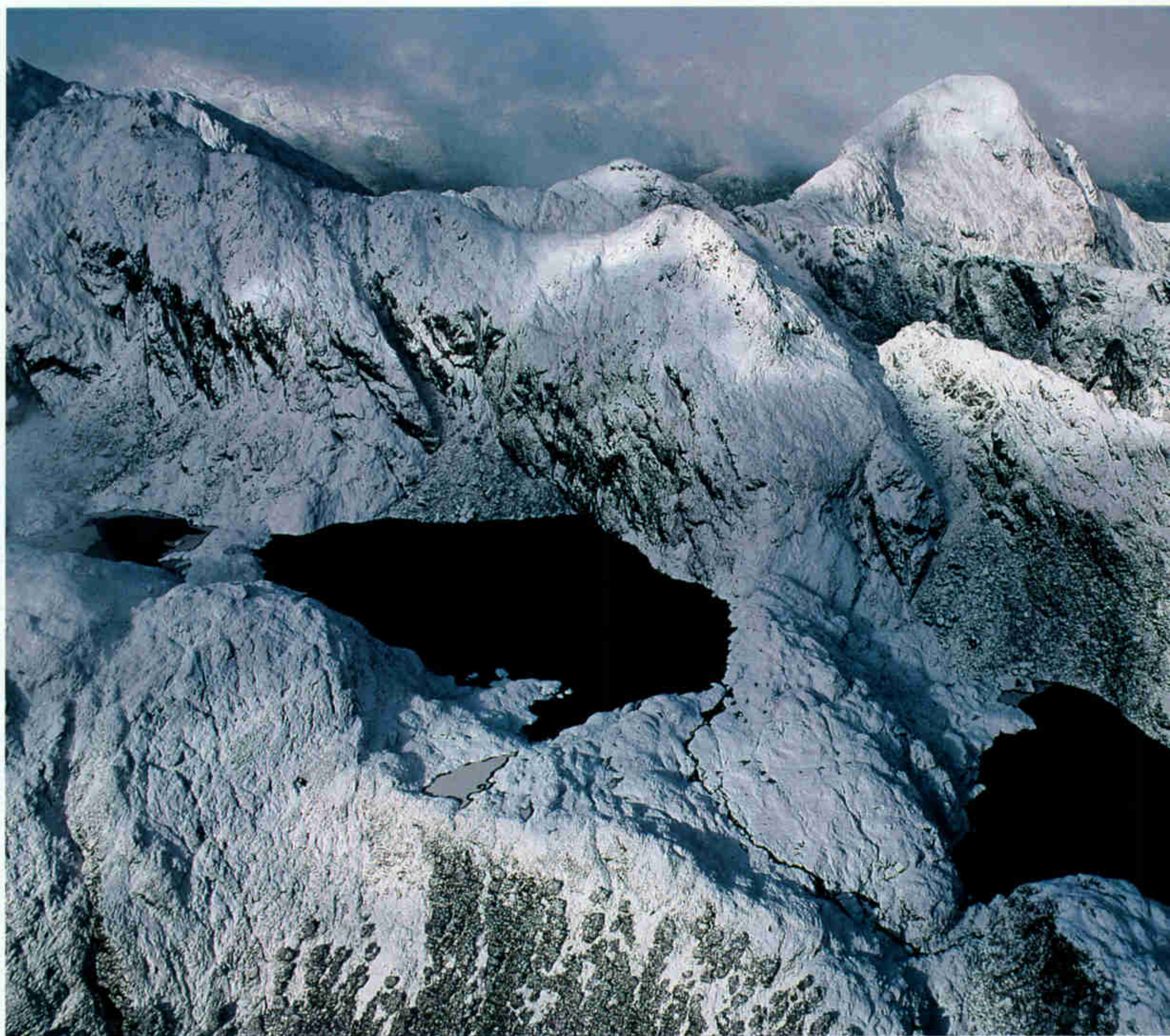


IN MAORI MYTHOLOGY THE FIORDS ARE THE

extended dousing, whole hillsides of forest are swept into a valley or fiord, leaving bone white rock scars that take decades to heal.

Fiordland's water balance is a delicate one. In La Niña years, when the atmospheric tap is turned off for relatively long periods (a week without rain can be a drought here), trees with insufficient root depth dry out beyond recovery. On some of the islets brown tree skeletons mar the forest. But dehydration is not the image most visitors remember. Rather it is water, in every form and at every scale, that saturates the mind: the dusting of frost that velvets a frozen pond; blue-black tarns, undisturbed by any ripple, set like mirrors in tawny tussock fields; rivers in spate, coffee brown, roiling beneath a hiker swaying on a three-wire bridge.

All that water falling on the land has an impact out in the fiords. Were I to lean over the side of *Renown* and draw up a bucketful of water, it would be quite drinkable because a layer of fresh water floats on the salt. This runoff, stained brown with tannins from the forest, can reach a depth of 30 feet after heavy rains and acts as a sunblock, cutting down



WORKMANSHIP OF AN ADZE-WIELDING SUPERMAN.

Muscular mountains and chasms “frightful to behold” impressed Capt. James Cook, who in 1773 became the first European to explore this region. Brawny peaks still embrace unnamed lakes in terrain as daunting as it is remote.



light penetration and allowing deepwater creatures to live in shallow conditions. Gorgonian fans, sea pens—strange, quill-shaped corals—and black coral trees (some 200 years old) are among the exotic groups found here at depths scuba divers can reach.

At dusk I go ashore on a nameless island and follow a path that penguin feet have pattered smooth over generations of journeys to and from the sea. The peaty walkway leads up to a network of roots and waterlogged tunnels beneath a broadleaf tree. A mud-spattered Fiordland crested penguin chick comes to investigate, then retreats, splashing away into the dank interior. An adult calls raucously, and a few minutes later appears at the entrance of the labyrinth. The Fiordland crested penguin is another of the park's rare birds. I am lucky to have seen this pair: the chick brown and downy, the adult in smart black-and-white livery and sporting a bleached-blond streak of feathers above each eye, giving it a jaunty look, like a surfer in a suit.

WE STEAM SOUTHWARD again, to Preservation Inlet, the last fiord. On Chalky Island, near the entrance of the inlet, the stoat busters go ashore. I join them as they check one of the traplines. They are relieved to find no new captures; the hens' eggs with which each trap is baited have not been touched. The team will stay here for a month, using dogs to sniff out fugitives. Not a single stoat must remain alive on this island destined to serve as a haven for endangered creatures—a sanctuary within a sanctuary.

A few miles farther on, at Fiordland's southwestern tip, stands Puysegur Point lighthouse. For a century—apart from a blackout during World War II—its beam protected ships navigating this stormy coast. Puysegur is a wild place. Southerly winds, sweeping up from the Antarctic, smack into this knuckle of land first, before dumping their moisture on the high peaks farther north. Sometimes, during a fierce gale, young relieving keepers would stagger to the edge of the cliff, hold their oilskin coats out wide and lean forward until they lost their balance, trusting the wind to catch them and fling them back. They reckoned that if a man had the nerve for this sport, he would never lack for courage for the rest of his life.

Nobody lives here now. The lighthouse was automated in 1989 and runs on solar power. The day I climb the mile-long track from the beach to the abandoned station is uncannily calm. For once the roaring forties have held their breath. I stand at the edge of the cliff in a cloud of sand flies and try to imagine those daredevil birdmen leaning into the void.

Below me, a hundred feet straight down, bull kelp writhes in the surf. Lobster boats work the offshore reefs. To the north, land and sea meet in a confusion of islands and waterways. Inland, I see the same tumult of mountains that James Cook described as “so crowded together as to leave room for no vallies of extent.” The landscapes of Fiordland do not soothe. Their chiseled features preserve the memory of violent upheaval—tattoos on the hull of Maui's great canoe. □

MORE ON OUR WEBSITE

Go On Assignment with Kennedy Warne to New Zealand's Fiordland and Zoom In on new photos by Annie Griffiths Belt at nationalgeographic.com/ngm/0012.

On a Friday afternoon in October the Holdingford High School homecoming court poses in a pickup painted with Holstein markings. Queen Tanya Bieniek stands next to king Kyle McNeal, the Huskers' starting cornerback. Tanya: "It was fun that week. We stayed up late the night before at Khristal Wynnemer's house and slept over and got up and did each other's hair. The whole senior year was great. I'd been shy before, but I was elected class motormouth." Kyle: "The football team had a pretty good season, but we screwed up on our homecoming game. Mentally we weren't there, and we lost. But the whole week was cool." Tanya: "Our senior class was less than a hundred people, and everyone knew each other. A lot of us got really close. It was a great year. I took woodworking classes and decided to become a carpenter. I want to build houses. I like framing up the walls. I've always liked pounding nails."



IN SEARCH OF LAKE WOBEGON

IT'S IN CENTRAL MINNESOTA, ACCORDING TO ITS CREATOR

BY GARRISON KEILLOR

PHOTOGRAPHS BY RICHARD OLSENIUS





St. Anthony, a village northeast of Freeport. Shirley Schiffler is on the town council: "I grew up in a family of 12 in St. Anthony. I thought about leaving, but it's real nice here. The county put up a sign saying population 80, but we counted 77 not long ago. The last three or four houses sold in St. Anthony have been sold to families with kids, so maybe the population is going up. The lots are big, and half the people have vegetable gardens, at least a couple rows of peas and corn and some onions and tomatoes. It's nice black dirt. The tavern is the only business, Schiffler's, run by my brother Ervin. We used to have a grocery store but it closed. The council meets every May to approve the liquor license. In September we get together to see if there are any problems. And we meet in December to close the books. We deal with things like people not cutting their grass or weeds. No complaints about taxes. No problems with the bar."



Twenty-five years ago, for amusement, I invented a small town where the women are strong and the men good-looking and all the children above average and started telling stories about it on the radio, and ever since then people have asked me if it's a real town, and if it is, then where is it exactly?

I used to say it's fiction. "Oh," they said. "Sure." But they were disappointed. People want stories to be true. They don't care so much about your gifts of invention as the fact that your story reminded them of people they knew when growing up. They want you to say, "The character of Darlene is based about 95 percent on my cousin Charlotte in Dubuque. I only changed the hair from auburn to blonde and made her more chesty." So I started telling people that the town is in central Minnesota, near Stearns County, up around Holdingford, not far from St. Rosa and Albany and Freeport, northwest of St. Cloud, which is sort of the truth, I guess.

Thirty years ago I lived in Stearns County with my wife and little boy in a rented brick farmhouse south of Freeport, an area full of nose-to-the-grindstone German Catholics devoted to their Holy Mother the Church and proud of their redneck reputation. We moved there for the cheap rent—\$80 a month for a house and half-acre vegetable garden, a great boon to a struggling writer. Beyond the windbreak was a couple hundred acres of corn. Cows stood in the pasture and studied us. The Sauk River was nearby to canoe on, and Watab Lake to swim in. It was a land of rolling, well-tended hog and dairy farms punctuated by tidy little towns, each with a ballpark, two or three taverns, and an imposing Catholic church with a cemetery behind it where people named Schrupp, Wendelschafer, Frauendienst, Schoppenhorst, and Stuedemann

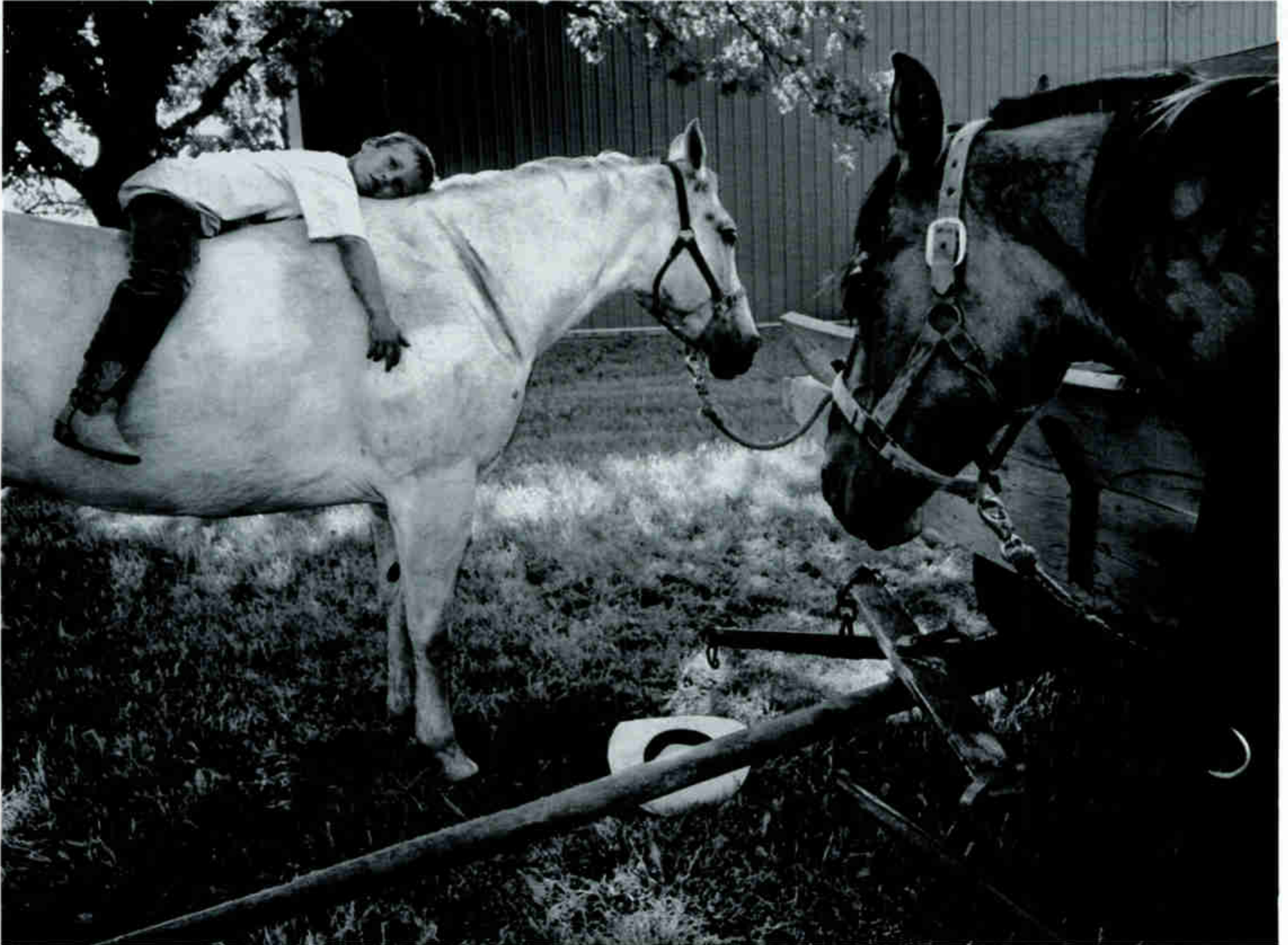
lay shoulder to shoulder. There were no Smiths to speak of.

When I invented Lake Wobegon, I stuck it in central Minnesota for the simple reason that I knew a little bit about it, and most people, if they know Minnesota at all, know the scenic parts—the North Shore, the Boundary Waters, the Mississippi Valley—and nothing about Stearns County. This gave me a fairly free hand.

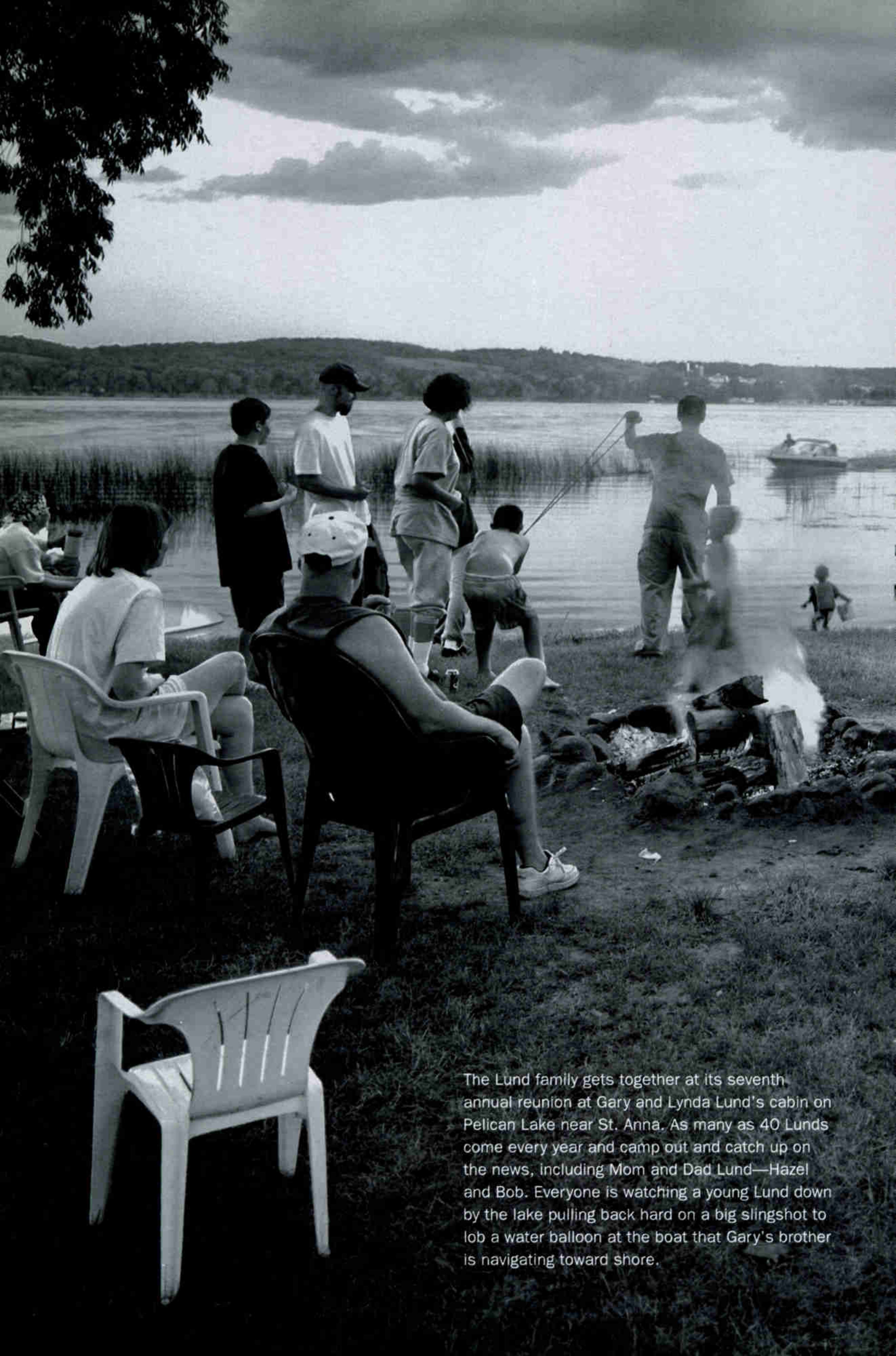
I said that Lake Wobegon (pop. 942) took its name from the Ojibwa word that means "the place where we waited all day for you in the rain," and if anyone asked why the town appeared on no maps, I explained that when the state map was drawn after the Civil War, teams of surveyors worked their way in from the four outer corners and, arriving at the center, found they had surveyed more of Minnesota than there was room for between Wisconsin and the Dakotas, and so the corners had to be overlapped in the middle, and Lake Wobegon wound up on the bottom flap. (In fact, the geographic center of the state is north of there, in Crow Wing County, but never mind.)

To the German Catholics I added, for dramatic interest, an equal number of Norwegian Lutherans. The Norwegians, ever status conscious, vote Republican, and the Germans vote Democratic because the Norwegians don't. The Catholics worship at Our Lady of Perpetual Responsibility and the Lutherans at Lake Wobegon Lutheran Church (David Ingqvist, pastor), home of the National Lutheran Ushering Champions, the Herdsmen.

"Gateway to Central Minnesota" is the town slogan. And through the gateway over the years came a procession of characters. The three boys who drive to Iowa one February morning when they hear of Buddy Holly's plane crash and discover his blue guitar in the snowy field. The stolid Father Emil who says, in regard to abortion (and much else), "If you didn't want to go to Minneapolis, why did you get on the train?" and the town handyman Carl Krebsbach who repairs the repairs of the amateurs, and Bruno the fishing dog, and the irascible Art of Art's Bait & Night O'Rest Motel, its premises studded with warnings ("Don't clean fish here. Use your brains. This means you!!!"), and Dorothy of the Chatterbox Cafe and her softball-size caramel rolls



Jake Hinnenkamp stretches out on a gray gelding, Vandy, outside Linda B's bar and grill in St. Rosa. His folks, Darrell and Suzette, were inside enjoying the annual hog roast. Suzette: "Darrell's from Melrose, and I'm from Long Prairie. We met horseback riding. He was riding with his friends and I was riding with mine, and my friends turned out to be friends of his friends. He rode up alongside me and said, 'I wonder if your horse rides double.' I said I didn't think so, and he swung over and sat behind me. I didn't know what to do so I just hung on. We live on ten acres outside Melrose. We have six horses in all. We lived in town before, but we'd never move back. I like the quietness. I like looking out the window and not looking into someone else's. Darrell's home place is just across the road from us. His brother is farming it. He milks about 50 cows, Holsteins. That horse Vandy is very tolerable with kids. Jake's been on him since he was about a month old, on his first trail ride."



The Lund family gets together at its seventh annual reunion at Gary and Lynda Lund's cabin on Pelican Lake near St. Anna. As many as 40 Lunds come every year and camp out and catch up on the news, including Mom and Dad Lund—Hazel and Bob. Everyone is watching a young Lund down by the lake pulling back hard on a big slingshot to lob a water balloon at the boat that Gary's brother is navigating toward shore.



("Coffee 25¢, All Morning 85¢, All Day \$1.25, Ask About Our Weekly Rates"), and Wally of the Sidetrack Tap, where old men sit and self-medicate. It was Wally's pontoon boat, the *Agnes D.*, on which 22 Lutheran pastors once crowded for a twilight cruise and weenie roast, and when the grill fell over and the crowd bolted and *Agnes D.* pitched to starboard, they were plunged into five feet of water and stood quietly, heads uplifted, waiting for help to arrive. It's a town where the Lutherans all drive Fords bought from Clarence at Bunsen Motors and the Catholics all drive Chevies from Florian at Krebsbach Chevrolet. Florian is the guy who once forgot his wife at a truck stop. Her name is Myrtle. She is a hoot.

The stories I tell on the radio always start with the line, "It's been a quiet week in Lake Wobegon," and then a glimpse of the weather. It's a fall day, geese flying south across a high blue sky, the air sweet and smoky, the woods in gorgeous van Gogh colors, or it's winter, snowflakes falling like little jewels from heaven, trees glittering, the bare limbs of trees penciled in gray against the sky, or it's spring, the tomato plants sprouting in trays of dirt on the kitchen counter, tulips and crocuses poking out of the ground, yellow goldfinches arriving from Mexico, or it's summer, the gardens booming along, the corn knee-high, and a mountain range of black thunderclouds piling up in the western sky. And then I go on to talk about Norwegian bachelor farmers sitting on the bench in front of Ralph's Pretty Good Grocery or the Chatterbox, where large phlegmatic people sit at the counter talking in their singsong accent. *So how you been then?* Oh, you know, not so bad, how's yourself, you keeping busy then? *Oh yeah, no rest for the wicked.* You been fishing at all? *I was meaning to but I got too busy. How about yourself?* Nope. The wife's got me busy around the house, you know. *Yeah, I know how that goes—* and so forth. And I slip into the story, and take it around the turns and bring it to a point of rest, and say, "And that's the news from Lake Wobegon," and that's all there is to it.

Two years ago, after my telling people for years that Lake Wobegon was near Stearns County, the county made a section of Great Northern railbed into a bike trail and named it the Lake Wobegon Trail, thus putting my imaginary town on the map, and last spring

I decided I had better spend a few days driving around the area, to see if it was there or not.

Minnesota is a state of decent hard-working rural people, most of whom live in cities and don't care for them much and prefer the outskirts where you can own two or three or five or ten acres—what real estate agents call a hobby farm, with room for a garden, an immense yard, a dog kennel, a shed, a snowmobile, and a satellite dish, and so Minneapolis and St. Paul sprawl far out into farm country, the outer citizens commuting an hour or more each way so as to enjoy the illusion of rural life. There are trace elements of hobby farms almost all the way to St. Cloud, the Stearns County seat.

The eastern approach to Lake Wobegon is Division Street, St. Cloud, a four-mile strip of free enterprise in full riot, the fast-food discount multiplex warehouse cosmos adrift in its asphalt sea, the no-man's-land of 24-hour gas stations that sell groceries and photocopies, and the shiny plastic restaurants where, if you ate lunch there for the rest of your life, you would never meet anybody you know or get to know anybody you meet, a tumult of architecture so cheap and gaudy and chaotic you wonder how many motorists in search of a drugstore and a bottle of aspirin wound up piling into a light pole, disoriented by flashing lights and signage and access road signs. And then the cosmos peters out and you emerge from hell and come into paradise, rural Minnesota.

You drive past the rolling fields, the valleys of little rivers, and every farmstead is different, some more formal, with white painted fences and all the buildings at right angles; others seem to have grown without much supervision and are strewn with old vehicles and historical artifacts of an appliance nature. Some are exposed, nearly treeless, and others are barely visible from the road, deep in their woodlots. Some have a limber and attentive dog who will take a run at you if you slow down.

There are major poultry operations in the county, vast prison camps of chickens, and a big mail-order outfit, and some big granite quarries near Rockville, blasting out millions of cubic feet of rock every year.

(West of St. Cloud is a sign, "Buy Direct/Monuments," and an outdoor display of dozens of gravestones arranged as if in a cemetery, but the faces are blank.) At the Rockville quarry stand stacks of 24-ton blocks of granite with striated grooves down the sides, including Rockville Beige and Diamond Pink, two local granites, and also Mesabi Black, and Lake Superior Green, and black granite from Africa. There never was a Minnesota Granite Rush back when the rock was first discovered; it's too much work getting the stuff out of the ground. And I never mention quarrying in the Wobegon saga because I don't know the first thing about it. I only talk about abandoned quarries where teenagers go to swim and drink beer and neck.

The county appears to be prospering: population up 35 percent since 1970, new prefab industrial buildings cropping up along the main routes, trucks at the loading docks, forests of billboards as you approach Freeport and Avon and Albany. Avon (pop. 1,144) even has what looks to be a suburb on the east side of town, with suburban street names like Angelfish Avenue, Barracuda, Char. The dairy farms are as trim as ever: new silos in evidence, the big hip-roof barns well kept, the cows themselves look professional, courteous, goal oriented. Corn prices are low, but farmers here raise corn only to feed cows, and milk prices are still good enough, barely, to live on.

(One farmer told me that barns start falling apart if the cattle are evacuated; cows keep the temperature and humidity up, and if they are sold off, the barn goes to pieces fairly quickly. A symbiotic relationship.)

Holdingford (pop. 638) is the town that looks most Wobegonic to me. It has a fine little downtown of elderly brick buildings and a big thriving grocery and a classic four-legged, cone-topped water tower (torn down after my visit, I was sorry to hear), a graveyard full of big stones, and down by the river the Holdingford Mill, a jewel-like assembly of galvanized-metal cylinders and boxes and sloped roofs, and a faded old red boxcar on an abandoned siding that would have been headquarters for a gang of boys except it is smack in town, too close to enemy lines.

I dropped into Mary's Family Restaurant, formerly the Rainbow Cafe, for coffee and oatmeal raisin cookies and eavesdropped on

a fellow reminiscing about the great Armistice Day blizzard of 1940. He was 14 at the time, and it made a big impression on him. He and his brothers walked out of a second-story window onto the snow and dug a tunnel to the barn. He talked about logging up north and picking potatoes in North Dakota and earning a buck twenty-five a day. "Today everybody wants to make 20 bucks an hour and not do any work," he said. There were four of us at the counter, and none of us disagreed with him. I myself would prefer to not do any work for much more than twenty bucks an hour but didn't wish to discuss it.

New Munich is the town closest to the farm my family and I lived on. You drive past the sign ("Welcome to New Munich, Home of Munichfest," which shows a dancing couple smiling, holding beers in their free hands), past Spinners Bar and Grill, New Munich Meats, the Munich Hofbrau, and come to the church, a big dramatic brick church trimmed in carved sandstone, with a bell tower, clock-faces on all four sides, and magnificent heavy doors with big black hinges, a veritable cathedral in a town of only 335. Nothing about this modest village prepares you for the grandeur within—the inlaid tile floor and the high columns with figured capitals, the rose windows in the transepts, the lovely statues with the compassionate faces. I thought I had based Our Lady of Perpetual Responsibility on this church, but I could see that I didn't get the baroque feel at all. Such a huge sanctuary, leaping arches, big organ and choir loft in the back, organ pipes, all illuminated by tall stained-glass windows: If I'd put it in Lake Wobegon, nobody would've believed it.

It's a county of many grand churches: St. Benedict's in Avon, with its red roof and bell tower, and St. Rose of Lima at the end of two rows of tall cedars in St. Rosa, and Seven Dolors in Albany, an orange-brick beauty that glows in the setting sun, and Sacred Heart in Freeport, a fine tall yellow-brick edifice with a high steep roof. But the church in New Munich stands out as a mighty architectural shout, an exuberant brick crescendo meant to astonish farmers and shopkeepers for all time and bring doubters to their knees.

Freeport calls itself the Dairy Center of the World, and in *(Continued on page 102)*





In Charlie's Cafe on Main Street in Freeport at 7:30 a.m. the regulars have coffee. From left they are Gilbert Roerick, Max Wenker beside him, Tony Funk (hidden, across from Max), and Art Van Heel in the striped shirt. In the booth to the right sit Butch Bonfig and Larry Beuning. Art Van Heel: "Most of our gang goes in about seven in the morning and sits around for an hour or so having coffee. We've been going in there for years and years, and we sit at the same booth unless somebody beats us to it. Coffee just went up to 90 cents from 75, but in St. Cloud it's \$1.25, so you can't complain too much. We shoot the breeze, catch up on the gossip. We talk about politics some, but if it gets too rough, we drop it."

Gary Thelen leans against the bran finisher in the Swany White Flour Mill, Freeport (below), which has been in the Thelen family since 1903. The round bin at center is for finished flour. Gary: "More than 50 percent of my production today is organic. I do organic white, soy, buckwheat, whole wheat, and barley flours. If it wasn't for the natural foods market, staying in business would be a struggle."

The Corpus Christi procession on a May day at St. Mary's Church, Holdingford (right). In the middle, Cindy Scepaniak follows her altar boy sons, Bobby and Adam, and leads girls in their First Communion dresses, carrying baskets of flowers. The two-hour event has a sermon at beginning and end.

Main Street, Freeport (below right). Resident Arnold Hoeschen says his family helped build the town: "We pronounce it Hessian, not Hoeshen, but we accept it both ways. The family name is in stone up over the Corner Store, built by Joe Hoeschen, who also built the Pioneer Inn. I'm descended from Joe's brother Louie. My brother still farms Louie's place. My great-grandpa Anton was mayor of Altenbeken, Germany. He came over in 1876 with his wife, eight sons, two daughters, his brother, and his dad, my great-great-grandpa. Four of Anton's boys became businessmen and four became farmers. I'm 72 and retired now from the bank. I wanted to be a farmer, but I knew the bank wouldn't lend me the money to buy one, so I went to work there and stayed at the bank for 38 years."









Ervin Kerfeld drives tractor as his rock pickers—three sons, two grandkids, and four neighbor boys—clean out his cornfield in the spring. Ervin: “Rocks are hard on equipment. They can break the knives on a corn chopper, which cost \$80 apiece, and there’s 12 of those. We pick about 25 or 30 loads every spring. We start kids out picking at the age of seven or eight, for four hours after school, so they don’t get too tired. They ask me, ‘Is this rock big enough to pick?’ I say, ‘No, leave it. It’ll be bigger next year.’”

“We’ve got 430 acres now, 260 cultivated, and we raise pigs and dairy cows. During the hard times in the thirties, Dad took his cattle on the train north to Bemidji to graze because there was nothing green around here. Dad got high blood pressure, left the farm, and moved to Sauk Centre. He wrote a book called *The Ups and Downs of Three Kerfeld Generations*. Every morning he’d walk a mile into town to church, and then he’d play cards. He lived 30 more years after he retired. All that walking was good for his heart.”

Charlie's Cafe the cook does not stint on dairy products: The banana cream pies are big enough to be bowling trophies. I had a grilled-cheese sandwich, a bowl of chili, and a slab of pie, and felt my belt and collar tightening. I got up and walked along the main drag. I saw an old man walk out of the post office who reminded me of Florian Krebsbach, a man in a brown porkpie hat and pale blue polyester suit and green plaid shirt with a string tie with an agate on the clasp and wearing white shoes. When I lived here 30 years ago, Freeport was my post office, my supply station, and once I went into the bank and asked a loan officer if I could borrow money, offering my fiction as collateral as a farmer might borrow against his corn crop. The officer said he didn't think so.

Freeport was a railroad town, and the tracks ran along the south side of Main Street, and now the tracks are gone, and the one-sided Main Street remains, like an architect's rendering. Down the street is the Pioneer Inn. The Sidetrack Tap in Lake Wobegon was modeled after it, a gloomy smoke-filled sour-smelling tavern, cluttered with neon beer signs and deer heads and mottoes ("Don't Sleep In Our Bar, We Don't Drink in Your Bed"), except the Pioneer Inn has been cleaned up and remodeled, the sourness expunged. A few guys at the bar were talking about fishing and the lottery, neither of which was paying off for them lately. One of them said that Big Watab Lake, southeast of there, is 120 feet deep and home to some mighty pugnacious fish, none of which he had caught lately.

The Central Minnesota Arts Board lists two dozen theater companies and music groups in the county, but it doesn't mention the dozens of taverns and cafés that are the actual centers of culture here. Like Fisher's, an old screen porch of a supper club in Avon, open only in the summer, where you bring your own whiskey and they supply the glass, the ice, the baked walleye dinner with salad. Places with names like the Corner Bar, Sportsman's Bar, Tip Top, or the Buckhorn, where gentlemen congregate for the purpose of enjoying a cold one and solving the problems of the world. They plant themselves in a booth, or lean against the bar, and they enact a classic four-character play: There's the Reader, who has come across an interesting item in the paper ("I read that within five years they'll have

figured out how to throw a bunch of genetically engineered enzymes into a steel tank full of wet silage and turn it into milk"), and there's the Grouch, who maintains a dark view of human nature ("the big corporations are behind it because they want to clear out the little guys and put in 10,000-acre farms"), the Worrier, always a little nervous about something ("genetic engineering or not, I just can't see things getting better anytime in the foreseeable future, I'll tell you that"), and the Big Fella, the guy who holds back until the topic is exhausted and then gives the final word ("people are not going to buy artificial milk. That's been proven. You can bet on it"). They sit and hold forth on politics (corrupt, on both sides, always has been), global warming (hogwash), golf (a huge waste of time), the Internet (ditto), education (not what it used to be), women (creatures of superstition and pointless ritual), the benefits of physical exercise (when it's your time to die, you die, whether you walk two miles a day or not), and they take turns buying rounds, and if you happen to believe that mankind is on the verge of a new age of enlightenment and progress, these gentlemen will have a fine time pulling your chain.

Being there, drinking a beer, looking down the bar toward the others standing 15 feet away brought back a sudden clear memory of 1970 and sitting in the very same spot near the door and overhearing men talk and wishing I knew how to join in that conversation. A sudden jolting memory I had put away for 30 years.

Nobody ever welcomed us to town when we came in 1970. No minister visited to encourage us to worship on Sunday, no neighbor dropped in with a plate of brownies. Several times I stopped at neighboring farms to say hello and announce our presence and was met in the yard by the farmer, and we spent an uncomfortable few minutes standing beside my car, making small talk about the weather, studying the ground, me waiting to be invited into the house, him waiting for me to go away, until finally I went away. In town the shopkeepers and the man at the garage were cordial, of course, but if I said hello to someone on the street, he glanced down at the sidewalk and passed in silence. I lived south of Freeport for three years and never managed to have a



Noontime at St. John's-St. Andrew's Catholic School in Meire Grove, where boys linger over lunch in the activity room. The room, with its oak wainscot and maple floor, dates back to 1915. Half the room is used for basketball. Here 68 children from 40 families attend grades three through six. A hand-lettered sign outside says, "Please No Vandalism." Sister Suzanne Slominski is the principal: "These are good, well-behaved kids. They come from good homes, so they come to school to learn. Their favorite programs are accelerated reading and accelerated math. They get 15-minute 'power' lessons and study as much as they want and take tests on our iMac computers and find out exactly what they have mastered and what they need to work on. We have 18 computers. They're looking forward to college. They want to be scientists. A couple want to be mathematicians. Some want to be teachers, which pleases me a lot."

Members of the Catholic War Veterans Post #1685 gather at Luethmer's Bar in St. Wendel on Memorial Day (below). They attended Mass in the morning in North Prairie, then visited five cemeteries to place flags and flowers on the graves of all veterans, say a prayer, and fire a three-round salute. Bert Schlangen, a dairy farmer from Bowlus, in the front row wearing a black tie, is the post commander. Bert: "I'm the young guy. I served in the Army in the Vietnam era. I was the eighth of 17 kids, and the five older boys all served in the Army."

The Segler family (right)—Bob and Joann, their sons Danny, Justin, and Robbie, and their dog Misty—waits for the volunteer fire department to set off fireworks at Bowlus Fun Days on the Fourth of July. The daylong annual celebration is a "big thing" in Bowlus, says Charlie Sobieck, who owns the local grain elevator. Charlie: "We have bingo, a snow-cone stand, cotton candy, polka bands, and a parade with floats. It's a good gathering for people to see people they haven't seen in years."

Teenagers from Melrose hang out at Lake Sylvia (below right). Brianna Hill, 17, stands on the dock at far left. Brianna: "The same crowd comes here just about every afternoon, 10 or 15 people. I usually go with Briana Zenzen and Sheena Hoeschen. We're all pretty outgoing. The main hangout at night is the Conoco gas station in Melrose. We hang out and talk and figure out where the local party is. Parties go on until about one in the morning. It's cool if you're alone, and girls talk to boys whether they have a boyfriend or not. It's cool."







The Ervin Kerfeld house. Ervin: "My family's been here a hundred years as of last year. My grandfather Bernard Kerfeld came over from Germany and bought 160 acres from a homesteader. He was hard-working like all Germans. He built the house we live in now and had six kids, including my dad, Leo, who had seven. I was born in the bedroom I sleep in now. My wife, Jeannette, and I have eight boys and a girl. My son Randy will take over next year." Randy: "We kids caught the school bus right in front. We could look out the window and see it coming from the north, so we knew when to walk out. My youngest brother just graduated, so the bus doesn't stop here anymore, but it did, every morning, for about 30 years."



conversation with anyone in the town. I didn't have long hair or a beard, didn't dress oddly or do wild things, and it troubled me. I felt like a criminal.

This fear of outsiders was explained to me years later by a Stearns exile who said that the German population was so traumatized, first by the anti-Teutonic fevers of World War I that forbade the use of their language in schools, then by Prohibition that made outlaws of decent upstanding beer drinkers, that they never could trust *auslanders* again. A strange face is, to them, a cruel face. My German neighbors were a closed community, and I wasn't in it and had no part of it. Proximity does not bestow membership.

I accepted this because I come from similar people. Mine were Protestant fundamentalists, who lived by the Word and not by the opinion of others, and were wary of strangers, and didn't go in for small talk, period. We were taciturn people to start with who could sit in silence for long stretches and not feel uncomfortable. If strangers came to the door, they were dealt with and sent on their way. They were not people of the Word, and their friendship meant nothing to us.

As I sat in the Pioneer Inn and recalled the years I spent in Stearns County, it dawned on me where Lake Wobegon had come from. All those omniscient narrator stories about small-town people came from a guy sitting alone at the end of a bar, drinking a beer, who didn't know anything about anything going on around him. Stories about prodigals welcomed home, outcasts brought into the circle, rebels forgiven: all from the guy at the end of the bar. In three years only one man ever walked the 15 feet to find out who I was—he walked over and said, "You live out on the Hoppe place, don't you." I said that I did, and he nodded, satisfied that now he had me placed, and turned and moseyed back to the herd. There was nothing more to say. So I invented a town with a bar in which, if a stranger enters, he is, by God, without fail, intriguing to the regulars, and conversation ensues and he turns out to be someone's long-lost cousin. In order to be accepted, I had to invent a town like the imaginary friend I had in second

grade, David, who walked to school with me.

The loner nursing his beer at the end of the bar is starved for company. He and his wife have little to say to each other these days, and in the long shadows of a winter night, in extreme need of society, he drives to town and sits at the bar, where his pride and social ineptitude get in the way. He has no idea how to traverse those 15 feet without feeling like a beggar, so he goes back home to his typewriter and invents characters who look like the guys in the bar but who talk a blue streak, whose inner life he is privy to, and soon he has replaced the entire town of Freeport with an invented town of which he is the mayor, the fire chief, the priest, the physician, and the Creator himself, and he gets a radio show, and through perseverance and dumb luck and a certain facility the fictional town becomes more famous than the real town, and now when he goes to Freeport, some people come up and say, "You're Garrison Keillor, aren't you." A person could write a story about this.

I respect Stearns County for its egalitarianism. It may look down on strangers, but it looks down on all of them equally, and it doesn't look down on people because they have less money or do dirty work. And it has a real culture. It doesn't draw its identity from the media, it draws it up out of the past, like well water. The media world is a small town of its own, and information is the currency—who's up, who's down, what's new, what's newer—but here the currency is character, as expressed in stories. So I made up stories about its character, morphing some of my old fundamentalist relatives into German Catholics.

I had a train pull up on a sidetrack in 1938 and an aging Babe Ruth step down and wave to the crowd. He was with the Sorbasol barnstorming team that played the local nine that afternoon, and the Babe hit one so far it was never found again. The ballpark is still there. The Whippets play there, and in the spring middle-aged men who have smelled the April air come with a glove and toss a ball around.

Here beside the tracks is the foundation of an old grain elevator that, one Saturday night in the summer of 1942, as various couples sat and smoked and drank beer and necked in their cars along the train tracks, went up in a pillar of

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Listen to Garrison Keillor read from "In Search of Lake Wobegon" at nationalgeo.com/ngm/0012.

flame 500 feet high, and people leaped from those cars and tore for cover and the churches were full the following Sunday. Most of those couples married soon afterward, and most of the marriages lasted. Not a true story, but when the thing blew up, it seemed real enough.

The cemetery in Freeport is behind the church, but in Lake Wobegon I put it on a hill, which Freeport doesn't have. It was there that Clarence Bunsen gave his famous Memorial Day address.

The VFW honor guard stood at parade rest in front of the monument to the Grand Army of the Republic. Their feet hurt, their jackets pinched, they needed a drink. The crowd stood waiting on the grass. A boy recited:

*Breathes there the man with soul so dead,
Who never to himself hath said,
"This is my own, my native land!"
Whose heart hath ne'er within him burn'd
As home his footsteps he hath turn'd
From wandering on a foreign strand?*

There was a tremendous long silence, and then Pastor Ingqvist gave a nod and Clarence stepped forward and said, "If there were one time when words truly seemed inadequate, one occasion when silence seemed so appropriate, it would be here and now. It would be more fitting if we were silent for two minutes and looked around us and thought of our people here and their gifts to this country." He stepped back. Everyone looked around at the markers and the little flags fluttering and listened to the breeze in the leaves. An oriole sang. And then someone blew his nose. The whole honor guard was crying. Old men with rifles to their shoulders dug down in their pockets and got out their big red hankies and blew.

And afterward they pressed around Clarence and shook his hand and said it was perfect, they'd be grateful to him for the rest of their lives. He didn't tell them that when Pastor Ingqvist nodded to him, he suddenly remembered that he was supposed to speak, and a wave of guilt washed over him that he had forgotten Memorial Day, the day of remembrance, and he wanted to cry out, "I am not worthy!" And then he felt steady again. "It's not about you," he thought. "You're not the reason they're here." And he stepped forward and said his piece.

I feel the same way about Stearns County and Lake Wobegon. It isn't up to me. I can't

re-create it. I find that if I leave out enough details in my stories, the listener will fill in the blanks with her own hometown, and if a Freeport girl exiled in Manhattan hears the story about Memorial Day, she'll put it right smack there in that cemetery with those names on the stones, and she may think of her uncle Alcuin who went to France and didn't return, and get out her hanky and blow. I'm not the reason she's moved, he is. All I do is say the words: cornfield and Mother and algebra and Chevy pickup and cold beer and Sunday morning and rhubarb and loneliness, and other people put pictures to them. □



Here lies Carolina Hoeschen, born Carolina Buckholdt in New Munich in 1872. She married Moritz Hoeschen, a Freeport storekeeper, and bore six children, two of whom died in childhood. She died in 1908 and now resides in Sacred Heart Cemetery in Freeport. Near her feet is a row of ash and cherry trees. Old headstones bear German inscriptions (*Hier Ruht in Gott*). Arnold Hoeschen of Freeport, a relative, says: "When I was in the first grade, the priest gave the homily in German. It was long, and just when we thought it was over, he'd say: '*Und noch ein Punkt*—And one more point.' We older folks grew up speaking German. I have a friend in a nursing home who has Alzheimer's. He's lost his English, but he still has his German, and when I go see him we talk Low German. We had only Catholics here, but now there's an Assembly of God church just starting. We're welcoming them. What else can we do?"





IN A RUGGED CORNER
OF CHINA FIVE
FRIENDS PURSUE A
GEOLOGIC WONDER
FOUND BY FAMED
BRITISH EXPLORER
ERIC SHIPTON A HALF
CENTURY AGO.

Journey to
Shipton's
Lost

Arch

BY JEREMY SCHMIDT
PHOTOGRAPHS
BY GORDON WILTSIE



ROTTEN ROCK

Belayed by Nancy Feagin, Sam Lightner, Jr., picks his path to the summit hoping his holds stay put. The arch's crumbling conglomerate, known in climbing slang as "choss," posed a nasty problem for the team. "At times it would break apart in my hands," said Lightner. "It was barely rock."





E

VEN FROM TEN miles away, the arch was stunning the first time it came into view—an enormous Gothic window framed in stone, lit from behind by the afternoon

sun. Five of us had arrived in a desert oasis called Mingyol in western China, having come halfway around the world on what some—including the jostling crowd of villagers around us—considered a curious quest: to reach, and then to climb, that tantalizing span of rock.

When we drove our dusty 4WD into their poplar-shaded village, people materialized from green fields and mud-walled homes, wondering who we were and what we wanted.

It was a pilgrimage of sorts that had brought us to this remote mountain range—a walk in the footsteps of the legendary British mountain explorer Eric Shipton. In his book *Mountains of Tartary* Shipton had described the “scores of bold pinnacles” we gazed at now, noting that one was “pierced by a hole . . . below its summit almost down to its base.” Shipton tried to reach that arch, but three times a seemingly impenetrable maze

SOLVING THE MAZE

Within sight but tantalizingly out of reach, Shipton’s arch beckons Mark Newcomb, Jeremy Schmidt, and local guides (above). Like Shipton, the team was initially stymied by the labyrinth of peaks and slot canyons guarding the arch. After the successful climb Schmidt (below) sketched the span with stick figures on top for the men of Mingyol, where the elusive arch inspires local legends. “This guy got really excited,” Schmidt says. “He began yelling to the others in Uyghur, ‘They actually got on top of the thing!’”





of foothills, slot canyons, and sheer-walled towers stopped him short. After months of attempts he finally reached the arch but left it unclimbed.

We aimed to reach the arch too—and climb it in his memory. But we, like Shipton, would have to solve the riddles of this tortured terrain. Could anyone help us?

On the edge of the crowd an old, white-bearded man with a black hat and kind eyes gave a nod of recognition. He remembered an Englishman who was “about 40, not tall, but big,” who had

“Never . . . had anyone seen the Arch from close to, let alone reached it.” —ERIC SHIPTON

to East Africa, from Mount Everest to the untraveled glaciers of the Karakoram. I marveled at his achievements and admired his spirit.

Born in 1907, by age 22 Shipton had logged the first ascent of Nelion, one of Mount Kenya’s twin summits. In 1931 he and five companions were the first to summit 25,447-foot Mount Kamet in northern India, at that time the highest peak ever climbed. In 1933 he climbed within a thousand feet of the top of Mount Everest and later pioneered the route that Edmund Hillary and Tenzing Norgay used to reach the summit in 1953. He didn’t make a big fuss—he just climbed and explored everything in sight. Before he died in 1977, he set standards and laid out dreams for others to pursue.

People liked Eric Shipton.

He made friends easily and kept the ones he made. Although he married only once, many women were drawn to him. Admirer Beatrice Weir was just 17 when she met him at a garden party in India. “Suddenly,” she later said, “there appeared this extraordinary brown-faced man, fairly small, with strong legs and a strong body, a shock of hair and slightly weak chin. He had blazing blue eyes everyone used to talk about; he just sat and looked. It

was indefinable. I melted like an ice cube.”

Yet there was something distant about him, as if he held an important part of himself in reserve, as remote and wild as the mountains he loved so much. His greatest pleasure came from journeys into unknown, unmapped terrain, and he preferred to take the simplest way possible. Dismayed by the massive scale of a typical Everest expedition, he scorned the “small town of tents that sprung up each evening, the noise and racket of each fresh



come to Mingyol by truck with his wife and friends. After 50 years of Chinese history, civil war, and revolution,

we had found a living memory of Eric Shipton.

“Since Shipton,” he added softly, “you are the first to come looking.”

Even just looking, it was thrilling to be there. For years I had read Shipton’s gripping accounts of mountain adventure from the Alps



start, the sight of a huge army invading the peaceful valleys.”

Instead, Shipton and his climbing partner, Bill Tilman, joked that they could “organise a Himalayan expedition in half an hour on the back of an envelope.” Unusual in the 1930s, their no-frills style has since become the standard—lightweight, low impact, self-propelled, culturally sensitive, and motivated by the sheer joy of exploration.

ALL THIS WAS on my mind last May when Mark Newcomb, Nancy Feagin, Sam Lightner, Jr., Gordon Wiltsie, and I arrived in Kashgar, Xinjiang Province, with plans for our adventure—friends on a lighthearted, lightly laden excursion to the far side of the planet. Our admiration for Shipton, and curiosity about his arch, had brought us together. We tried to imagine Kashgar as he would have seen it in 1940, when he arrived there to assume his post as British consul.

Among Britain’s most remote diplomatic posts, Kashgar was Shipton’s kind of place. Isolated, difficult to reach, steeped in the romance of Central Asia, the city lies on the edge of the vast Taklimakan Desert in the shadow of the continent’s greatest mountain ranges. For some 2,000 years it served as a way station and

CROSSROADS OF CULTURES

In the ancient trading town of Kashgar, 25 miles southeast of the arch, a Uygur man inspects recent arrivals: motorcycles used by city dwellers. Department stores, high-rise apartments, and a rail line from Beijing are slowly modernizing the city. Hand-pulled noodles (right) served with vegetables and tea remain a Kashgar staple.

trading center on the Silk Road. It was also a strategic vantage point for players in the “Great Game”—the political struggle for Asian dominance between Britain and Russia in the late 19th and early 20th centuries. At the junction of shifting empires, the region was controlled by China, but rebellions, civil war, and conquest often tested that control. During Shipton’s time there was no telling who might win.

By all accounts Shipton was an effective diplomat. He led excursions into the surrounding country, where he climbed mountains and combined hunting with exploring and even some amateur spying. Every month he sent to India secret reports filled with political analysis and information on rebellions, intrigues, troop movements, and Soviet activities in the region.

On forays outside of Kashgar he occasionally caught glimpses of the formation that local people called Tushuk Tash, or Hole Rock.

Intrigued, he set out to find it. Three times he and his wife, Diana, along with other companions, tried to approach it from the south side. Three times the labyrinthine fortress of eroded rock south of the arch thwarted their efforts. Finally they found a successful approach from the north. Shipton put his hand on the arch, but he lacked the modern climbing equipment that would have allowed him to ascend it safely.

IF HE COULD visit Kashgar today, Shipton would probably wince at its new Chinese-style business district, crowded with what he called “that great scourge of modern civilization, the internal combustion engine.” He’d feel more at home, as we did, among the old rhythms beyond the city center. Kashgar grew up in a vast green oasis fed by the melting snows of surrounding mountains—a huge garden of barley, wheat, vegetables, and melons.



The city still resembles Shipton’s “curious, medieval land,” where donkey carts haul goods and people along tree-lined lanes and where country people pour into the city once a week to attend the Sunday bazaar, said to be the largest of its kind in Asia. Graybeards in black robes and fur-trimmed hats head for the stock market—where they argue the merits of camels, horses, fat-tailed sheep, and cattle—while their wives stream through rows of bright fabrics, household goods, carpets, and jewelry.

As for the big arch, although it lies just 25 miles from Kashgar, it remains obscure. Our liaison in the city, Abdullah Hallick, had never been near it. Nor had his friends and

neighbors. We had acquired a set of Russian topographic maps, but they were practically useless. The maps showed the mountains accurately, but in the core of the range, where it really mattered, their contour lines went haywire. The cartographers had simply given up. I called these areas Vales of Despair. The mapmaker’s despair, that is—and our joy. Blank spots on the map are dishearteningly rare in these days of the global positioning system.

So to find the arch, we followed our imaginary companion Shipton—an expert in blank spots—to Mingyol, where we met the old man who remembered him. Entering the village that day, we found it a peaceful, shady place echoing with the sound of irrigation water, the soil damp beneath rows of poplars, cuckoos singing in the trees. It was home to some 50 Uygur and Kyrgyz families.

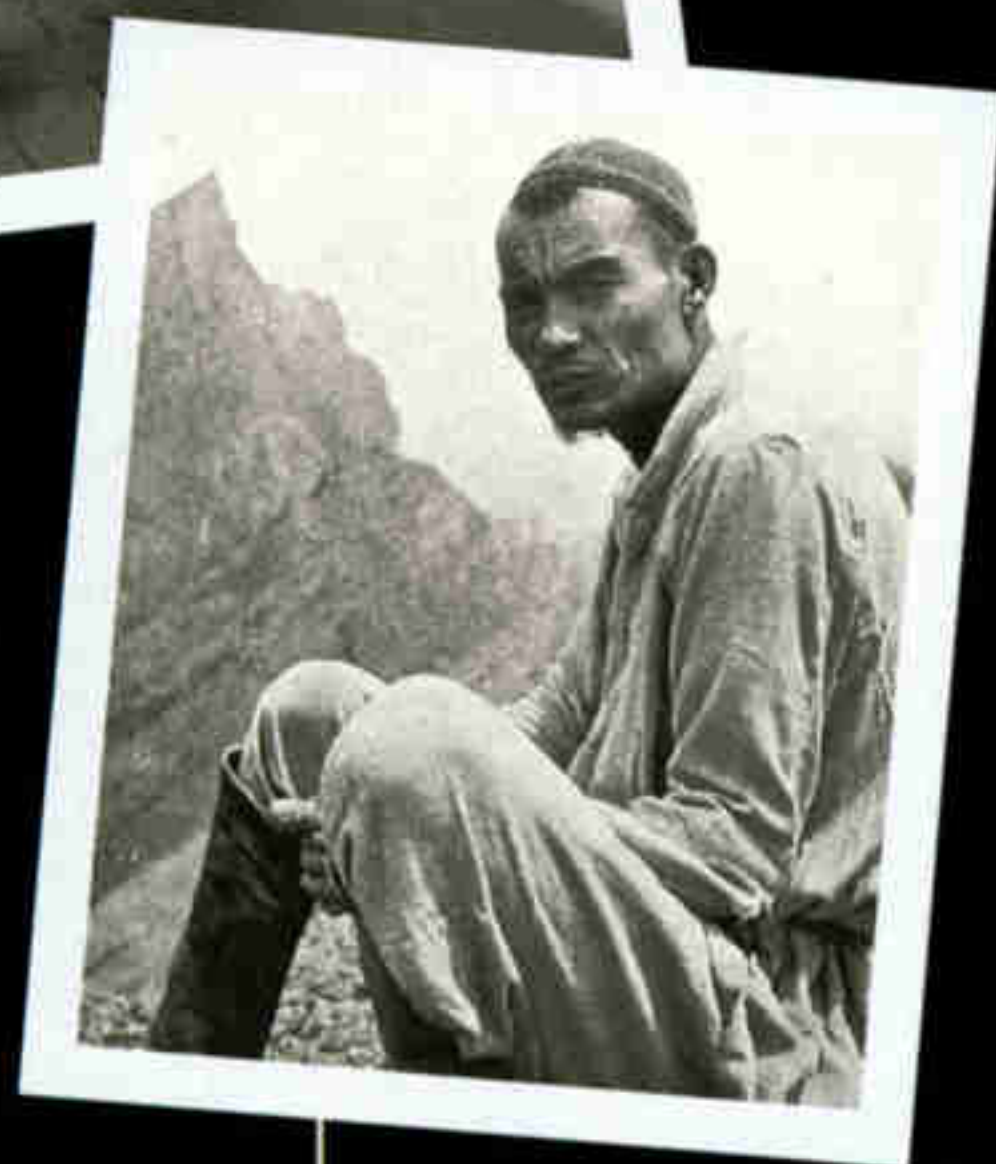
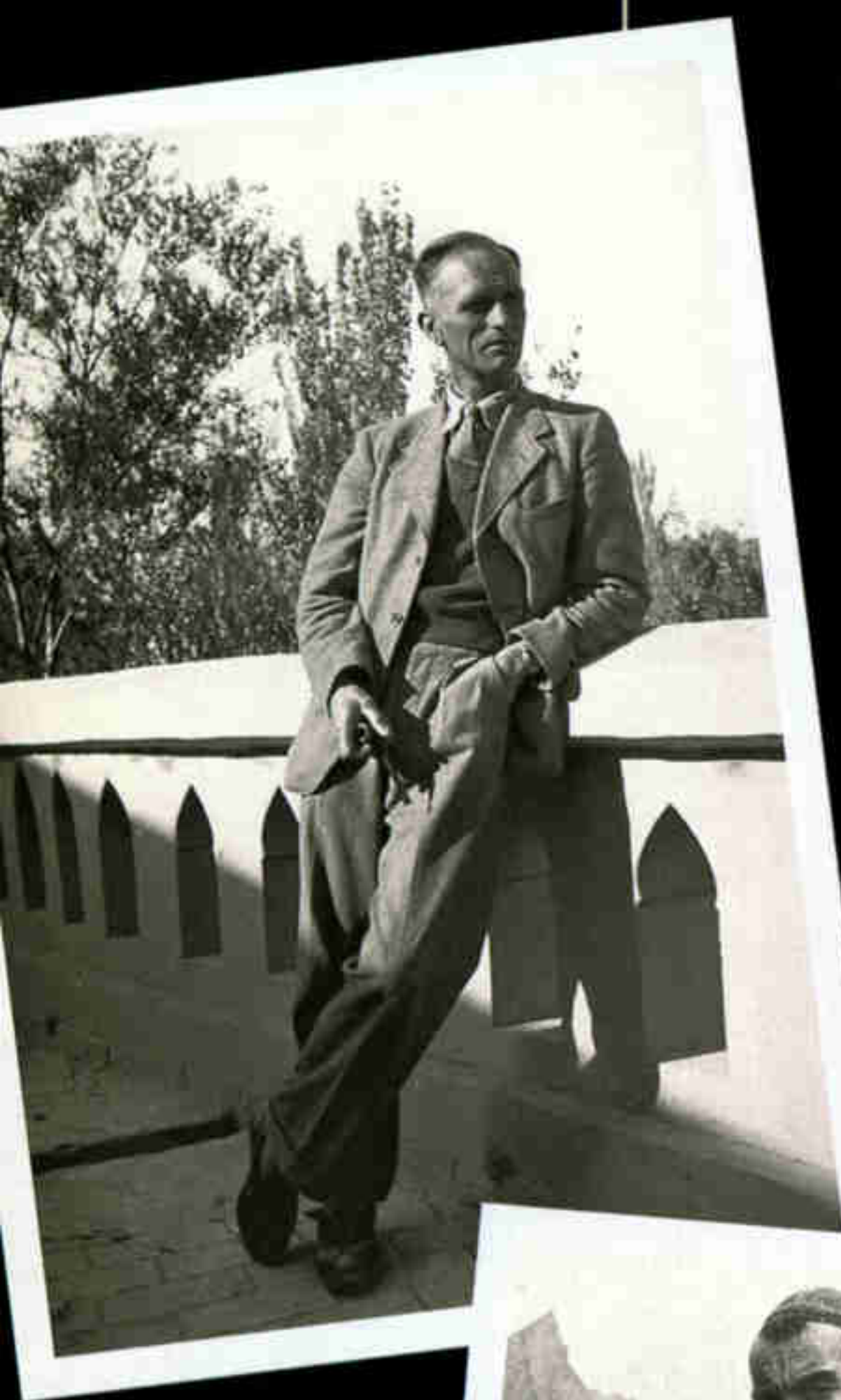
In Mingyol, Shipton had enlisted the help of a local villager to find the arch. His name was Usman Akhun, a man of “splendid physique and the easy rhythmic movements and self-assurance of an Alpine guide.” Hoping that such an impressive character would be remembered, we asked around and were soon led to the home of Torogan Usman, the youngest son of Usman. He leaned on a shovel with a shy smile and told us that his father had died some years ago at an old age.

Curious neighbors gathered. I asked if anyone had been close to the arch, close enough to touch it. “Why would you want to?” one man replied, to laughter. I dug out one of Shipton’s books and opened it to a picture of Usman (following page). This caused a stir. People passed the open book with sad looks. Some of the men took off their hats as it came to them. One elderly woman pressed it to her forehead with a mournful, keening sound.

Usman’s elderly brother-in-law, Juma Akhun, explained the sadness: Shipton’s group had been cheerful people, he said. Usman liked them and enjoyed traveling with them. But some years later, in the hard aftermath of Mao’s communist revolution, there had been trouble. Some local people with what he called “wrong ideas about foreigners” had punished Usman for associating with an Englishman. In telling this, the old man’s voice broke. Tears flowed

Revolutionary Explorer

Eric Shipton



Last British consul general in Kashgar, Eric Shipton lounges on the terrace of the consulate in 1941. He often took local guides on his rambles. Usman Akhun of Mingyol helped him hunt for the arch.

He was an odd choice for consul general of Kashgar in 1940, a 33-year-old mountaineer with blazing blue eyes, a soft British accent, and a cool graceful manner that inspired loyalty in men, passion in women. Sherpas revered him. The Soviet newspaper *Pravda* labeled him a spy. Two decades after his death his name borders on obscurity, but few explorers have had as lasting an impact on modern mountaineering as Eric Earle Shipton.

Born in Ceylon in 1907, Shipton made a name for himself by scaling Mount Kenya in Africa and later turned down a partnership in a gold mine to concentrate on climbing in the Himalaya. Best known for his four explorations of Mount Everest in the 1930s—and for leading the 1951 Everest reconnaissance that unlocked the southern route to the summit—he scorned the large military-style assaults of his day. With his frequent climbing partner, Bill Tilman, Shipton pioneered the philosophy of small, lightweight expeditions. In his 1969 autobiography, *That Untravelled World*, he wrote, “My strongest objection to a large [expedition] was that it destroyed the fundamental simplicity of mountaineering, which I have always regarded as one of its principal charms.”

Such radical ideas cost him the leadership of the 1953 expedition that took Edmund Hillary and Tenzing Norgay to Everest’s summit. But fame was never Shipton’s goal. In eight books of self-effacing prose he chronicled his love of blank spots on the map in the Himalaya, Karakoram, and Patagonia, inspiring generations of climbers to just pick up a pack and go.

into his beard, and I, mindful of Shipton's backcountry intelligence reports, did not press him for the painful details.

"I could take you to the arch," said a voice. I turned to see a slight, bald man. "Yes," said Arken Murat cheerfully. "I know the way."

It goes through deep canyons, he warned, dark and narrow and wet. We might have to swim. And when it rains, he added, "rocks come down!" He held his arms up and shook them to illustrate a flash flood. Then, grinning impishly, he asked his son to bring out his new green sneakers. He laced them tightly, then announced, "I can run like a deer. You'll never keep up!"

Piling into our 4WD, we drove three miles to a canyon at the base of the range, where I began to wonder if Arken was playing a joke on us. This canyon seemed wrong; it was too far west. On the other hand, this landscape had

foiled one of mountaineering's great explorers. When Arken charged up the canyon in his green sneakers, we followed.

Starting out, we could just see the pointed top of the arch but soon lost it behind high walls of unstable brown mudstone. For two hours we followed a small stream steeply uphill through a tangle of house-size boulders. We clambered over some and squeezed under others until we came to an abrupt change in the rock. Cliffs of hard gray conglomerate rose thousands of feet on either side of us. Our pulses quickened: Surely these were the "walls of the main massif" that Shipton had described five decades earlier in his book.

A few hundred yards farther, the cliffs closed in, blocking out the sky. As we picked our way upstream, twisting through shoulder-width narrows and scrambling up cold waterfalls, the canyon grew deeper and darker until it pinched down to a cavelike slit echoing with the sound of falling water. In a place like this in April 1947 Shipton encountered a frozen waterfall, a pillar of ice in a cul-de-sac so dark that he had to strike a match to see it. Unequipped for those conditions, he turned around.

So did we. It was getting late, and Arken said the first view of the arch was an hour away for him and three hours, he teased, for us. Either

IN SHIPTON'S FOOTSTEPS

Being posted to Kashgar was like winning the lottery for Shipton, who described it as "a dream world of mountains and deserts and measureless distance." On a camel trek in the region (below) the team found a land and lifestyle little changed since Shipton arrived via caravan in 1940.



JEREMY SCHMIDT

A woman wearing a white headscarf, a white sweater, a dark vest, and a long red skirt stands in a yurt. She is positioned next to a large, dark, vertical metal stove. A silver teapot sits on a shelf of the stove. The background features a wooden lattice wall and various items hanging on it, including a piece of paper and a metal pot. The floor is covered with a patterned rug and some debris.

WARM WELCOME

A Kyrgyz family prepares tea for the photographer inside its felt *akoi*, or yurt, the mobile home of the Central Asian steppes. Though they live spare lives, hospitality is a strong tradition. According to a regional saying: "When you arrive at my home is up to you. When you leave is up to me."

**“They desire more than
anything to be left in
peace, a condition they
have rarely experienced.”**

—ERIC SHIPTON





way we were out of time, stopped like Shipton at the bottom of a cold black pit.

We said farewell to Arken and the next day drove from Mingyol around to the north side of the range, hoping to find the route Shipton had finally taken to the arch.

To guide us, we had only the quirky Russian maps and a copy of Diana Shipton's book, *The Antique Land*. Her story of life in Kashgar includes more details than her husband's book of their successful attempt from the north.

To me this approach seemed just as difficult: The arch was completely hidden. The conglomerate rock was rugged and the country complex. The canyons and towers were jammed together so tightly that we began to think we could wander out there for days.

Suddenly we found our way blocked by a herd of sheep. They stared at us; we stared dumbly back. Only when a dog barked did we look up to see a young Kyrgyz shepherd perched on the slope above.

The boy scrambled down, and we showed him a sketch of the arch from Diana's book. He studied it for a moment, then smiled and gestured for us to follow him—back the way we had come, over a low hill to another canyon, and up that for two miles through some tight narrows, until . . . well, let Eric Shipton tell it: "At last, emerging from one of these clefts, we were confronted with a sight that made us gasp with surprise and excitement. The gorge widened into a valley which ended a quarter of a mile away in a grassy slope leading to a U-shaped col. Above and beyond the col stood a curtain of rock, pierced by a graceful arch."

Now we too had a grandstand view of the arch, towering hundreds of feet above us. Its window opened on a turbulent scene of strangely sculpted towers and canyons. At our feet the ground fell away in a sheer gorge, its



SHIPTON'S ARCH



BOTH BY JEREMY SCHMIDT

SCALING THE ARCH

Mark Newcomb fixes a rope on the final pitch to the summit (top). Lightner (above) later rappelled below the span to give Schmidt and Feagin (below) a reference point to measure the arch's full height. Using the tools at hand, they estimated it to be some 1,500 feet. Lightner (opposite) scouts the team's exit route by free climbing above the abyss.

bottom too deep to see. A strong wind rushed through from the south, funneled by the arch, and in the distance, some hundred miles or so across a stormy sea of brown desert, rose the gleaming, ice-covered Pamirs.

The scene made me dizzy. I was not prepared for the grandeur of the arch, nor for the "buzzers"—rocks dislodged by the wind that plunged down from the upper reaches of the arch. They fell fast, too fast to see, ripping the air with a vicious *vhzzzzzzzz*, followed long seconds later by the hard crack of stone on stone far below and out of sight. I couldn't help flinching every time one came by.

"Amazing," said Sam, standing beside me, "that this heaping pile of choss is standing at all." Choss, a climber's term, means loose, treacherous rock, the kind climbers avoid at all costs. The towers, consisting entirely of rounded

cobbles in a poorly cemented conglomerate, seemed to be crumbling as we watched.

DESPITE the unstable nature of the rock, we had to climb it, as Shipton would have. So two days later we returned with climbing gear and set about getting to the top. The rock was too loose for any route except the skyline ridge, a narrow, rounded crest about two feet wide. Mark, Sam, and Nancy—all expert climbers—spent a day establishing a route to the summit. Gordon and I followed on their ropes. It was not difficult climbing, but we had to set our feet very carefully and never trust any one stone.

From the pointed summit I peered into a surreal landscape of twisted canyons and looming gray towers. I felt exposed and strangely vulnerable. Knowing that this chossy rock we stood on was suspended over open air

“The canyon . . . looked more like a rift caused by some titanic earthquake.” —ERIC SHIPTON

made me queasy. Yet we still did not know how high the arch was. The world’s biggest documented arches, all in the American Southwest, span voids of 300 feet, so we knew we were dealing with a formation of unprecedented scale. How could we measure it?

There was one way, and I think Eric Shipton’s eyes would have gleamed at the prospect. Using our ropes as measuring tapes, we could lower ourselves below the arch to its base, then hike, slither, and climb through the dark and puzzling slot canyons back to Mingyol. We would not only measure the arch but also cross the range and solve the mystery of the maze.

Fifty-three years earlier Shipton had peered into the chasm beneath the arch. “A mile away,” he wrote, “the canyon was blocked by a massive tower . . . to pass it on either side or in either direction looked impossible.” We weighed

the hazards: falling rock, the chance of flash floods, uncertainty about the route ahead. In the end we gave in to the allure of the unknown, as I believe Shipton would have done.

Sam volunteered to take the upper section. The next morning he rappelled from the summit straight down the north face of the arch. I stood far below him on the facing hill as he worked carefully downward, a slow spider on a long thread, setting loose squadrons of buzzers. He made it to the edge of the opening, but there a strong wind set him swinging like a pendulum. Every time he swung under the arch, the rope would dislodge debris. A steady rain of pebbles hammered his helmet. Knowing that larger stones could follow, Sam scrambled back up the rope, having given us a ballpark measure of the arch’s upper third—nearly 500 feet.

Tightening our helmets against buzzers, we dropped straight below the arch on doubled ropes. Reaching the ends of our lines, we anchored ourselves to the wall and then pulled the ropes down from the anchors above. After the first rope came down, we were committed; no going back now.

Directly overhead, the arch split the sky. Sheer in places, embellished in others with mushroom shapes and wind-carved hollows, its underbelly was a Daliesque sculpture garden. After six rope lengths we were at the base of the arch, standing in a grotto and gazing up at what appeared to be an impossibly slender, impossibly fragile span of stone. We counted our rope lengths and were astonished: We had just dropped nearly a thousand feet. Added to the 500-foot upper section that we had measured earlier, it meant that Shipton’s arch was about 1,500 feet high, with a 1,200-foot opening—far and away the tallest natural arch in the world.

When we were all at the bottom, Mark gave a tug. The ropes slipped through the last anchor and came whistling down around us. We coiled them, stuffed them into our packs, and turned to what we hoped was the way home—a dark slot angling into the cobbled bedrock of the labyrinth. Torn between anticipation and jitters over what lay ahead, we plunged into the slot. Above us soared Shipton’s arch, but ahead lay undiscovered country, the kind that Shipton loved so well. □

MORE ON OUR WEBSITE

Gordon Wiltsie had “one of the scarier days of my life” on this assignment. Watch him tell his story at nationalgeographic.com/ngm/0012.

“Will I survive this day?”

After rappelling a thousand feet to the base of the arch, Newcomb navigates the maze of slot canyons. In Shipton's honor, the team risked rockfall and flash flood to become the first to traverse the range.

**PHOTOGRAPHER GORDON WILTSIE
WEIGHS HIS CHANCES**

A dead end. Once again our route from Shipton's arch through unexplored country had brought us to a precipice. We were down to our last few rappelling bolts, vital anchors for descending sheer cliffs. Without them we could be trapped forever in the Kara Tagh, a range of mountains and slot canyons where one false step—or an afternoon rainstorm—could seal our doom.

I was with some of the world's best climbers, yet even they were spooked by this devilish terrain. A number of scenarios flashed through my head, all of them terrifying: Starving to death, stranded on a ledge. Swept away by a sudden surge of rain. Trapped in a canyon that squeezed too narrow for us to pass. If any of these nightmares came true, no one would ever find us.

We had already rappelled a thousand vertical feet and pulled down our ropes, so there was no way to climb back up and out. And then we got lucky. At the bottom of one last cliff (left) the canyon finally opened to the south. We hiked out, giddy with success—and relief.



Ever wonder where that letter to Santa

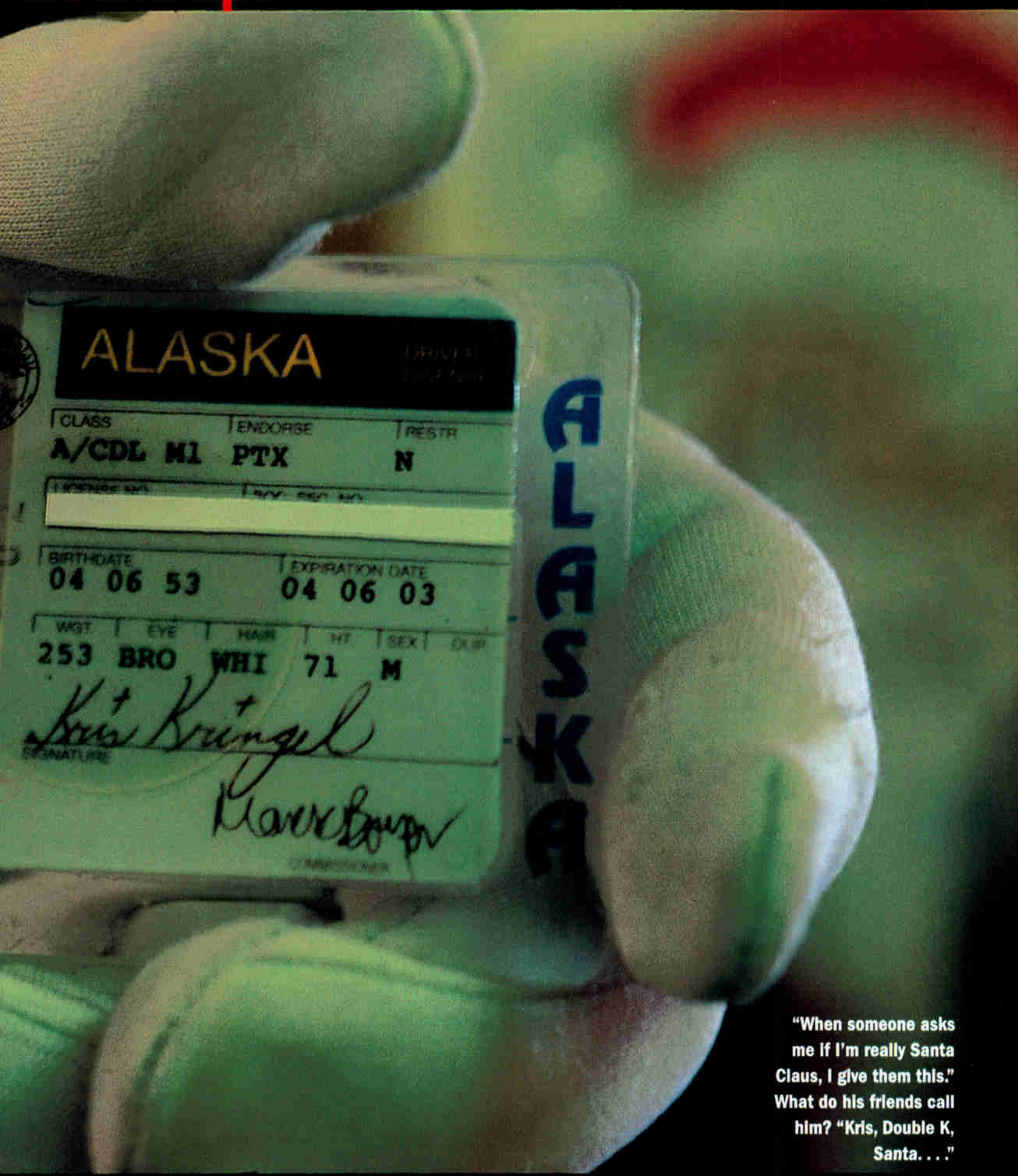
99705



BY GLENN HODGES
NATIONAL GEOGRAPHIC
EDITORIAL STAFF

PHOTOGRAPHS BY
MARIA STENZEL

wound up?



"When someone asks me if I'm really Santa Claus, I give them this." What do his friends call him? "Kris, Double K, Santa..."

NORTH POLE, ALASKA



Though 1,750 miles south of its namesake, North Pole, Alaska, can seem plenty cold and austere. But northern lights temper the dark winter, and nature beckons just past the refinery at town's edge.



J. T. Chambers doesn't fancy himself much of a Santa Claus. He's 14, just four feet eleven and 85 pounds, and he finds North Pole boring. "All there is to do is eat and watch videos and go to the doctor's office," he says. "And go tanning."

Yet when last season's Santa letters poured into this small Alaska town from around the world, he and other North Pole middle and high school students had to step up, muster their best ho-hos, and write the kids back.

"I didn't like it," he says. He felt a little over his head answering one letter from a girl who wished her parents wouldn't fight so much. "I said try to talk it out with your mom," J. T. says with a shrug. But even the standard wish lists bothered him. "It gave kids false hope about Santa Claus."

Nevertheless, that hope—false or otherwise—is the currency of North Pole. More than 1,700 miles from the actual Pole, this town of 1,600 is much closer to the North Pole of Santa Claus myth than most people will get. The children who get letters from Santa postmarked North Pole, Alaska, will never know they may have been written by kids not much older than themselves.

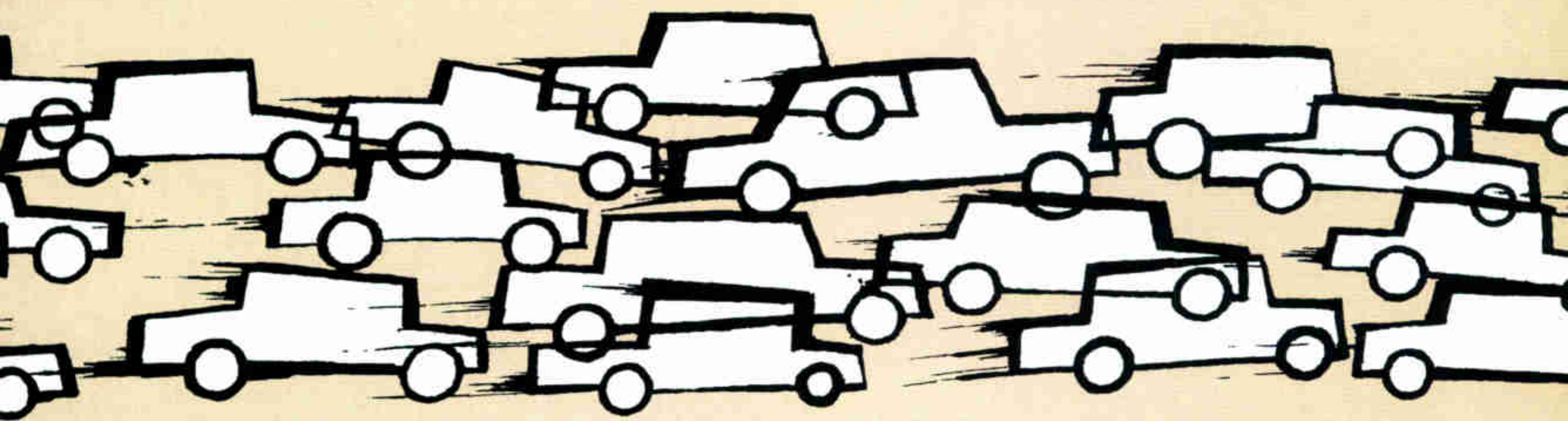
For the tourists who do make the trip here, North Pole's dichotomy is impossible to miss. Though the town bills itself as a place "where the spirit of Christmas lives year-round," gives its streets names like Snowman Lane and Saint Nicholas Drive, and dresses its lampposts like candy canes, its aesthetic is cheerlessly dominated by fast-food joints and strip malls. Stand where Richardson Highway crosses Santa Claus Lane and you can take in the heart of the town in an instant: McDonald's, Wendy's, Pizza Hut, Blockbuster.

The town's founders had higher hopes. According to local lore they

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POPULATION: 1,600
AMOUNT OF SUNLIGHT ON DEC. 21:
3 hrs 42 min
AMOUNT OF SUNLIGHT ON JUNE 21:
21 hrs 49 min
WEIGHT PULLED BY THE WINNING DOG IN THIS YEAR'S "WENDY'S BIGGIE SIZE WEIGHT PULL": 2,975 pounds
PRICE OF ONE SQUARE INCH OF NORTH POLE PROPERTY AT SANTA CLAUS HOUSE: \$5
ANNUAL NUMBER OF LETTERS TO SANTA RECEIVED AT THE POST OFFICE: 100,000

Going our way?



It's time to take cars in a new direction. Along a cleaner, more open road that travels the outskirts of convention. That's why we've created the Toyota Hybrid System, the power inside our breakthrough gas/electric vehicle, the Prius. Toyota is the first company to mass-produce a hybrid vehicle, and we're working to develop even more advanced technologies down the road. Fasten your seatbelts. It's going to be an exciting ride. www.toyota.com/ecologic 800-GO-TOYOTA ©2000

TODAY TOMORROW **TOYOTA**

NORTH POLE, ALASKA

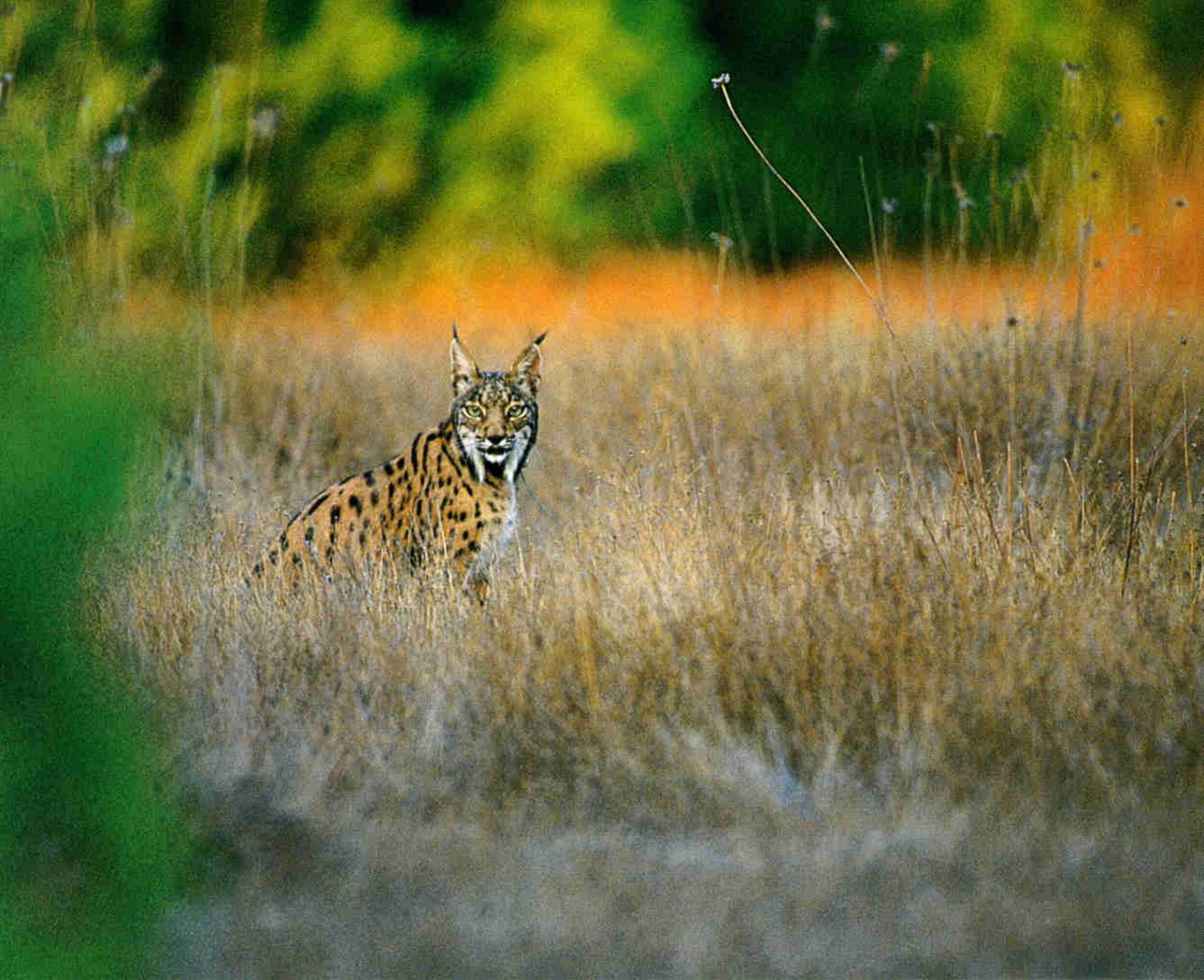


named it North Pole in 1952 hoping that toy manufacturers would come for the “Made in North Pole” bragging rights, despite its inconvenience—121 miles from the Arctic Circle—as a manufacturing site. The town’s third mayor doubled as St. Nick and built Santa Claus House, a Christmas knickknack shop with a part-time Santa, but that’s about all North Pole has to show potential tourists. Instead the town serves largely as a bedroom community for Fairbanks, 14 miles up the highway, and for two nearby military bases.

Yet there’s something here that people love beyond the Christmas gimmick. Charlie Livingston, like many in the area, came to Alaska with



March's sunny days and double-digit temps draw anglers to icy waters and dog fans to the Winter Carnival weight pull.



Photographed by Antonio Sabater Artés

WILDLIFE AS CANON SEES IT

An Iberian lynx sits quietly in the dry autumn grass, her tufted ears turned toward a potential intruder. Her two cubs are hidden in a thicket nearby, eating a newly caught rabbit, their staple prey. Born in the hollow of a large tree, the cubs soon move on to bushes where intertwined brambles and thick stalks provide refuge during the next weeks of their lives. The Iberian lynx once roamed throughout Spain and Portugal, but today only small and fragmented populations exist. Providing protection outside of reserves and ensuring

suitable habitat with prey are vital to the future of the endangered Iberian lynx.

As a global corporation committed to social and environmental concerns, we join in worldwide efforts to promote greater awareness of endangered species for the benefit of future generations.



Iberian Lynx (*Lynx pardinus*)

Size: Head and body length, male, 81 cm; female, 73 cm; tail 13 cm

Weight: Average male, 13 kg; female, 9 kg

Habitat: Mediterranean woodland and shrubland in Spain and Portugal

Surviving number: Estimated at 500-600





the military and never left. If he has his way, he never will. When I meet him at his taxidermy shop in a strip mall on the outskirts of town, he's frantically spraying pine scent to cover up the animal smells before "the lady," photographer Maria Stenzel, arrives. But he forgets to take down the *Playboy* calendar, and posters on the walls say things like "Never let go of your life preserver" set over an M16. There's no hiding who he is.

Charlie is a big guy, both in body and in spirit. When he gets together with his friends in the mornings at McDonald's, he tells the tallest tales, laughs the loudest laughs, and takes the most abuse. His buddies use him to size people ("that guy's at least as big as Charlie"), and they say to his face what a hack he is, how he couldn't stuff a pair of mittens. But behind his back they'll tell you, almost with tears in their eyes, how much they respect his work.

Hunting is a way of life here. When summer comes and the three-hour, 70-below-zero days of winter are but a distant memory, Alaskans come alive. The rivers beckon with salmon, the woods with moose and bear. And with their trophies in hand, men come to Charlie, because Charlie understands. "This land is in my soul," he says. "That's all there is to it."

It's a common refrain. Somehow this humble land—a flat expanse of evergreen, 75 miles from the nearest mountains—captures the spirit. Something happens. People find their place.

When I finally meet the man they call Kris Kringle at Santa Claus House, where he works weekends entertaining kids, I'm not expecting much. I've seen too many plastic Christmas decorations, and the way I look at it, you see one Santa, you've seen them all. But this Kris Kringle (spelled differently, he says, because "I don't want to take nothing away from him") has a story.

He used to be a truck driver in the lower forty-eight, an eighth-grade dropout with biker-bar nicknames like Wildman and Flying Dutchman. Then things started happening. An experience with Jesus turned his hair white, he says; friends asked him to be Santa for their kids; he found his joy—and he changed his name. And when he hurt his back and couldn't drive a truck anymore, he figured, where else would Kris Kringle live but North Pole? And so he came, eventually landing a job at Santa Claus House, and for a while delivering pizza on the side. Forty-seven years old, he scrapes to make ends meet.

"I'd like to be married and have a family, but I can barely afford what I got myself," he says. "It's lonely sometimes, but I went out and made a dent in this world, and look at the riches I've got now. The Bible says don't put your things up here on Earth but go and set 'em there in heaven."

It's all just words until a little girl sits on his lap. As she sits transfixed by his smiling eyes and silver beard, the souvenirs and T-shirts fade from view, and North Pole's Christmas spirit quietly sidles in.

"Do you like . . . pancakes or waffles?" Kringle asks in a gentle drawl. "Do you like . . . kittens or puppies?"

A good 20 minutes passes before her mother pries her away, and soon a four-year-old boy walks triumphantly toward Kringle's chair. His mom calls him Benjamin.

And as the boy sits on the lap of this man who has made himself Santa for a town that yearns to be special, he says, "No. My name is Batman!" □

Call them "snowmobiles" and you'll mark yourself as a hopeless outsider. They're "snowmachines," and they tether many a North Pole to sanity during the long winter. Cabin-fever sufferers lay countless tracks on the frozen rivers near town.



MORE INFORMATION

ON OUR WEBSITE More on North Pole at nationalgeographic.com/ngm/0012.

NOMINATE YOUR FAVORITE ZIP CODE at nationalgeographic.com/ngm/zipcode

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Tiny pumps produce acid in your stomach.



Prevacid turns many of these pumps off.

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Brief Summary of Prescribing Information
(Nos. 1541, 3046)
03-5036-R14-Brf., Rev. March, 2000

PREVACID®

(prē-va-sid)
(lansoprazole)
Delayed-Release Capsules

INDICATIONS AND USAGE

PREVACID Delayed-Release Capsules are indicated for: 1. Short-Term Treatment of Active Duodenal Ulcer 2. *H. pylori* Eradication to Reduce the Risk of Duodenal Ulcer Recurrence 3. Maintenance of Healed Duodenal Ulcers 4. Short-Term Treatment of Active Benign Gastric Ulcer 5. Treatment of Heartburn and Other Symptoms Associated With GERD (Gastroesophageal Reflux Disease) 6. Short-Term Treatment of Erosive Esophagitis 7. Maintenance of Healing of Erosive Esophagitis 8. Pathological Hypersecretory Conditions Including Zollinger-Ellison Syndrome.

CONTRAINDICATIONS

PREVACID Delayed-Release Capsules are contraindicated in patients with known hypersensitivity to any component of the formulation.

Amoxicillin is contraindicated in patients with a known hypersensitivity to any penicillin. (Please refer to full prescribing information for amoxicillin before prescribing.)

Clarithromycin is contraindicated in patients with a known hypersensitivity to any macrolide antibiotic, and in patients receiving terfenadine therapy who have preexisting cardiac abnormalities or electrolyte disturbances. (Please refer to full prescribing information for clarithromycin before prescribing.)

WARNINGS

CLARITHROMYCIN SHOULD NOT BE USED IN PREGNANT WOMEN EXCEPT IN CLINICAL CIRCUMSTANCES WHERE NO ALTERNATIVE THERAPY IS APPROPRIATE IF PREGNANCY OCCURS WHILE TAKING CLARITHROMYCIN. THE PATIENT SHOULD BE APPRISED OF THE POTENTIAL HAZARD TO THE FETUS. (SEE WARNINGS IN PRESCRIBING INFORMATION FOR CLARITHROMYCIN.)

Pseudomembranous colitis has been reported with nearly all antibacterial agents, including clarithromycin and amoxicillin, and may range in severity from mild to life threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of antibacterial agents.

Treatment with antibacterial agents alters the normal flora of the colon and may permit overgrowth of clostridia. Studies indicate that a toxin produced by *Clostridium difficile* is a primary cause of "antibiotic-associated colitis".

After the diagnosis of pseudomembranous colitis has been established, therapeutic measures should be initiated. Mild cases of pseudomembranous colitis usually respond to discontinuation of the drug alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation, and treatment with an antibacterial drug clinically effective against *Clostridium difficile* colitis.

Serious and occasionally fatal hypersensitivity (anaphylactic) reactions have been reported in patients on penicillin therapy. These reactions are more apt to occur in individuals with a history of penicillin hypersensitivity and/or a history of sensitivity to multiple allergens.

There have been well documented reports of individuals with a history of penicillin hypersensitivity reactions who have experienced severe hypersensitivity reactions when treated with a cephalosporin. Before initiating therapy with any penicillin, careful inquiry should be made concerning previous hypersensitivity reactions to penicillins, cephalosporins, and other allergens. If an allergic reaction occurs, amoxicillin should be discontinued and the appropriate therapy instituted.

SERIOUS ANAPHYLACTIC REACTIONS REQUIRE IMMEDIATE EMERGENCY TREATMENT WITH EPINEPHRINE, OXYGEN, INTRAVENOUS STEROIDS, AND AIRWAY MANAGEMENT, INCLUDING INTUBATION, SHOULD ALSO BE ADMINISTERED AS INDICATED.

PRECAUTIONS

General

Symptomatic response to therapy with lansoprazole does not preclude the presence of gastric malignancy.

Information for Patients

PREVACID Delayed-Release Capsules should be taken before eating.

Alternative Administration Options

For patients who have difficulty swallowing capsules, PREVACID Delayed-Release Capsules can be opened, and the intact granules contained within can be sprinkled on one tablespoon of either applesauce, ENSURE® pudding, cottage cheese, yogurt, or strained pears and swallowed immediately. The granules should not be chewed or crushed. Alternatively, PREVACID Delayed-Release Capsules may be emptied into a small volume of either orange juice or tomato juice (60 mL – approximately 2 ounces), mixed briefly and swallowed immediately. To insure complete delivery of the dose, the glass should be rinsed with two or more volumes of juice and the contents swallowed immediately. The granules have also been shown *in vitro* to remain intact when exposed to apple, cranberry, grape, orange, pineapple, prune, tomato, and V-8® vegetable juice and stored for up to 30 minutes.

For patients who have a nasogastric tube in place, PREVACID Delayed-Release Capsules can be opened and the intact granules mixed in 40 mL of apple juice and injected through the nasogastric tube into the stomach. After administering the granules, the nasogastric tube should be flushed with additional apple juice to clear the tube.

Drug Interactions

Lansoprazole is metabolized through the cytochrome P₄₅₀ system, specifically through the CYP3A and CYP2C19 isozymes. Studies have shown that lansoprazole does not have clinically significant interactions with other drugs metabolized by the cytochrome P₄₅₀ system, such as warfarin, antipyrine, indomethacin, ibuprofen, phenytoin, propranolol, prednisone, diazepam, clarithromycin, or terfenadine in healthy subjects. These compounds are metabolized through various cytochrome P₄₅₀ isozymes including CYP1A2, CYP2C9, CYP2C19, CYP2D6, and CYP3A. When lansoprazole was administered concomitantly with theophylline (CYP1A2, CYP3A), a minor increase (10%) in the clearance of theophylline was seen. Because of the small magnitude and the direction of the effect on theophylline clearance, this interaction is unlikely to be of clinical concern. Nonetheless, individual patients may require additional titration of their theophylline dosage when lansoprazole is started or stopped to ensure clinically effective blood levels.

Lansoprazole has also been shown to have no clinically significant interaction with amoxicillin.

In a single-dose crossover study examining lansoprazole 30 mg and omeprazole 20 mg each administered alone and concomitantly with sucralfate 1 gram, absorption of the proton pump inhibitors was delayed and their bioavailability was reduced by 17% and 16%, respectively, when administered concomitantly with sucralfate. Therefore, proton pump inhibitors should be taken at least 30 minutes prior to sucralfate. In clinical trials, antacids were administered concomitantly with PREVACID Delayed-Release Capsules; this did not interfere with its effect.

Lansoprazole causes a profound and long-lasting inhibition of gastric acid secretion; therefore, it is theoretically possible that lansoprazole may interfere with the absorption of drugs where gastric pH is an important determinant of bioavailability (eg, ketoconazole, ampicillin esters, iron salts, digoxin).

Carcinogenesis, Mutagenesis, Impairment of Fertility

In two 24-month carcinogenicity studies, Sprague-Dawley rats were treated orally with doses of 5 to 150 mg/kg/day, about 1 to 40 times the exposure on a body surface (mg/m²) basis, of a 50-kg person of average height (1.46 m² body surface area) given the recommended human dose of 30 mg/day (22.2 mg/m²). Lansoprazole produced dose-related gastric enterochromaffin-like (ECL) cell hyperplasia and ECL cell carcinoids in both male and female rats. It also increased the incidence of intestinal metaplasia of the gastric epithelium in both sexes. In male rats, lansoprazole produced a dose-related increase of testicular interstitial cell adenomas. The incidence of these adenomas in rats receiving doses of 15 to 150 mg/kg/day (4 to 40 times the recommended human dose based on body surface area) exceeded the low background incidence (range = 1.4 to 10%) for this strain of rat. Testicular interstitial cell adenoma also occurred in 1 of 30 rats treated with 50 mg/kg/day (13 times the recommended human dose based on body surface area) in a 1-year toxicity study.

In a 24-month carcinogenicity study, CD-1 mice were treated orally with doses of 15 to 600 mg/kg/day, 2 to 80 times the recommended human dose based on body surface area. Lansoprazole produced a dose-related increased incidence of gastric ECL cell hyperplasia. It also produced an increased incidence of liver tumors (hepatocellular adenoma plus carcinoma). The tumor incidences in male mice treated with 300 and 600 mg/kg/day (40 to 80 times the recommended human dose based on body surface area) and female mice treated with 150 to 600 mg/kg/day (20 to 80 times the recommended human dose based on body surface area) exceeded the ranges of background incidences in historical controls for this strain of mice. Lansoprazole treatment produced adenoma of rete testis in male mice receiving 75 to 600 mg/kg/day (10 to 80 times the recommended human dose based on body surface area).

Lansoprazole was not genotoxic in the Ames test, the *ex vivo* rat hepatocyte unscheduled DNA synthesis (UDS) test, the *in vivo* mouse micronucleus test or the rat bone marrow cell chromosomal aberration test. It was positive in *in vitro* human lymphocyte chromosomal aberration assays.

Lansoprazole at oral doses up to 150 mg/kg/day (40 times the recommended human dose based on body surface area) was found to have no effect on fertility and reproductive performance of male and female rats.

Pregnancy: Teratogenic Effects.

Pregnancy Category B

Lansoprazole

Teratology studies have been performed in pregnant rats at oral doses up to 150 mg/kg/day (40 times the recommended human dose based on body surface area) and pregnant rabbits at oral doses up to 30 mg/kg/day (16 times the recommended human dose based on body surface area) and have revealed no evidence of impaired fertility or harm to the fetus due to lansoprazole.

There are, however, no adequate or well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

Pregnancy Category C

Clarithromycin

See **WARNINGS** (above) and full prescribing information for clarithromycin before using in pregnant women.

Nursing Mothers

Lansoprazole or its metabolites are excreted in the milk of rats. It is not known whether lansoprazole is excreted in human milk. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from lansoprazole, and because of the potential for tumorigenicity shown for lansoprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Use in Women

Over 800 women were treated with lansoprazole. Ulcer healing rates in females were similar to those in males. The incidence rates of adverse events were also similar to those seen in males.

Use in Geriatric Patients

Ulcer healing rates in elderly patients are similar to those in a younger age group. The incidence rates of adverse events and laboratory test abnormalities are also similar to those seen in younger patients. For elderly patients, dosage and administration of lansoprazole need not be altered for a particular indication.

ADVERSE REACTIONS

Clinical

Worldwide, over 6100 patients have been treated with lansoprazole in Phase 2-3 clinical trials involving various dosages and durations of treatment. In general, lansoprazole treatment has been well tolerated in both short-term and long-term trials.

The following adverse events were reported by the treating physician to have a possible or probable relationship to drug in 1% or more of PREVACID-treated patients and occurred at a greater rate in PREVACID-treated patients than placebo-treated patients:

Incidence of Possibly or Probably Treatment-Related Adverse Events in Short-term, Placebo-Controlled Studies		
Body System/Adverse Event	PREVACID (N=1457) %	Placebo (N=467) %
Body as a Whole		
Abdominal Pain	1.8	1.3
Digestive System		
Diarrhea	3.6	2.6
Nausea	1.4	1.3

Headache was also seen at greater than 1% incidence but was more common on placebo. The incidence of diarrhea was similar between patients who received placebo and patients who received lansoprazole 15 mg and 30 mg, but higher in the patients who received lansoprazole 60 mg (2.9%, 1.4%, 4.2%, and 7.4%, respectively).

The most commonly reported possibly or probably treatment-related adverse event during maintenance therapy was diarrhea.

Additional adverse experiences occurring in <1% of patients or subjects in domestic trials are shown below. Refer to **Postmarketing** for adverse reactions occurring since the drug was marketed.

Body as a Whole - asthenia, candidiasis, chest pain (not otherwise specified), edema, fever, flu syndrome, halitosis, infection (not otherwise specified), malaise; *Cardiovascular System* - angina, cerebrovascular accident, hypertension/ hypotension, myocardial infarction, palpitations, shock (circulatory failure), vasodilation; *Digestive System* - anorexia, bezoar, cardiospasm, cholelithiasis, constipation, dry mouth/thirst, dyspepsia, dysphagia, eructation, esophageal stenosis, esophageal ulcer, esophagitis, fecal discoloration, flatulence, gastric nodules/fundic gland polyps, gastroenteritis, gastrointestinal hemorrhage, hematemesis, increased appetite, increased salivation, melena, rectal hemorrhage, stomatitis, tenesmus, ulcerative colitis; *Endocrine System* - diabetes mellitus, goiter, hyperglycemia/hypoglycemia; *Hemic and Lymphatic System* - anemia, hemolysis; *Metabolic and Nutritional Disorders* - gout, weight gain/loss; *Musculoskeletal System* - arthritis/arthralgia, musculoskeletal pain, myalgia; *Nervous System* - agitation, amnesia, anxiety, apathy, confusion, depression, dizziness/syncope, hallucinations, hemiplegia, hostility aggravated, libido decreased, nervousness, paresthesia, thinking abnormality; *Respiratory System* - asthma, bronchitis, cough increased, dyspnea, epistaxis, hemoptysis, hiccup, pneumonia, upper respiratory inflammation/infection; *Skin and Appendages* - acne, alopecia, pruritus, rash, urticaria; *Special Senses* - blurred vision, deafness, eye pain, otitis media, taste perversion, tinnitus, visual field defect; *Urogenital*

System - abnormal menses, albuminuria, breast enlargement/gynecomastia, breast tenderness, glycosuria, hematuria, impotence, kidney calculus.

Postmarketing

On-going Safety Surveillance: Additional adverse experiences have been reported since lansoprazole has been marketed. The majority of these cases are foreign-sourced and a relationship to lansoprazole has not been established. Because these events were reported voluntarily from a population of unknown size, estimates of frequency cannot be made. These events are listed below by COSTART body system.

Body as a Whole - anaphylactoid-like reaction; *Digestive System* - hepatotoxicity, vomiting; *Hemic and Lymphatic System* - agranulocytosis, aplastic anemia, hemolytic anemia, leukopenia, neutropenia, pancytopenia, thrombocytopenia, and thrombotic thrombocytopenic purpura; *Special Senses* - speech disorder; *Urogenital System* - urinary retention.

Combination Therapy with Amoxicillin and Clarithromycin

In clinical trials using combination therapy with PREVACID plus amoxicillin and clarithromycin, and PREVACID plus amoxicillin, no adverse reactions peculiar to these drug combinations were observed. Adverse reactions that have occurred have been limited to those that had been previously reported with PREVACID, amoxicillin, or clarithromycin.

Triple Therapy: PREVACID/amoxicillin/clarithromycin

The most frequently reported adverse events for patients who received triple therapy for 14 days were diarrhea (7%), headache (6%), and taste perversion (5%). There were no statistically significant differences in the frequency of reported adverse events between the 10- and 14-day triple therapy regimens. No treatment-emergent adverse events were observed at significantly higher rates with triple therapy than with any dual therapy regimen.

Dual Therapy: PREVACID/amoxicillin

The most frequently reported adverse events for patients who received PREVACID t.i.d. plus amoxicillin t.i.d. dual therapy were diarrhea (8%) and headache (7%). No treatment-emergent adverse events were observed at significantly higher rates with PREVACID t.i.d. plus amoxicillin t.i.d. dual therapy than with PREVACID alone.

For more information on adverse reactions with amoxicillin or clarithromycin, refer to their package inserts, **ADVERSE REACTIONS** sections.

Laboratory Values

The following changes in laboratory parameters for lansoprazole were reported as adverse events: Abnormal liver function tests, increased SGOT (AST), increased SGPT (ALT), increased creatinine, increased alkaline phosphatase, increased globulins, increased GGTP, increased/decreased/abnormal WBC, abnormal AG ratio, abnormal RBC, bilirubinemia, eosinophilia, hyperlipemia, increased/decreased electrolytes, increased/decreased cholesterol, increased glucocorticoids, increased LDH, increased/decreased/abnormal platelets, and increased gastrin levels. Additional isolated laboratory abnormalities were reported.

In the placebo controlled studies, when SGOT (AST) and SGPT (ALT) were evaluated, 0.4% (1/250) placebo patients and 0.3% (2/795) lansoprazole patients had enzyme elevations greater than three times the upper limit of normal range at the final treatment visit. None of these patients reported jaundice at any time during the study.

In clinical trials using combination therapy with PREVACID plus amoxicillin and clarithromycin, and PREVACID plus amoxicillin, no increased laboratory abnormalities particular to these drug combinations were observed.

For more information on laboratory value changes with amoxicillin or clarithromycin, refer to their package inserts, **ADVERSE REACTIONS** section.

OVERDOSAGE

Oral doses up to 5000 mg/kg in rats (approximately 1300 times the recommended human dose based on body surface area) and mice (about 675.7 times the recommended human dose based on body surface area) did not produce deaths or any clinical signs.

Lansoprazole is not removed from the circulation by hemodialysis. In one reported case of overdose, the patient consumed 600 mg of lansoprazole with no adverse reaction.

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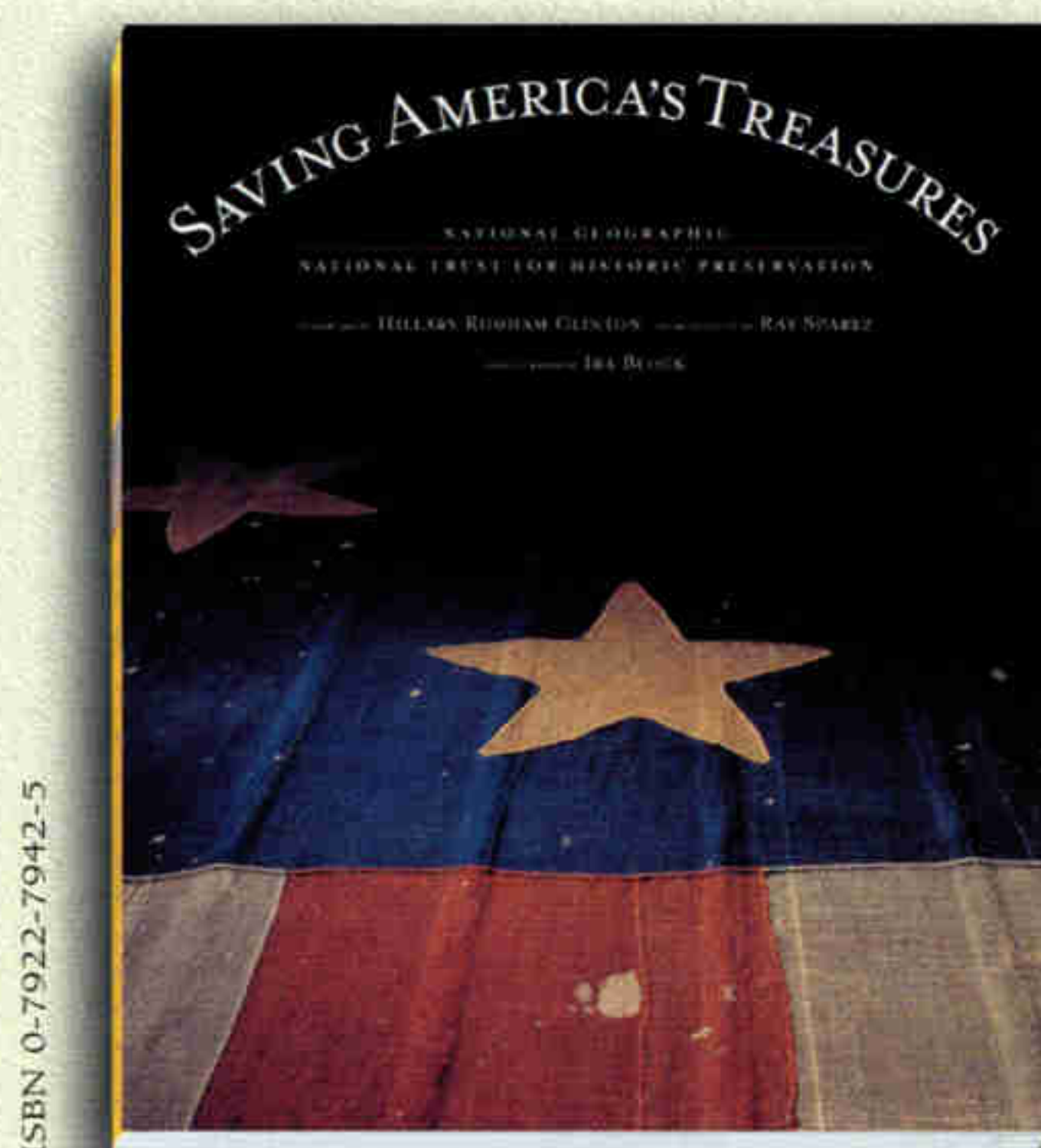
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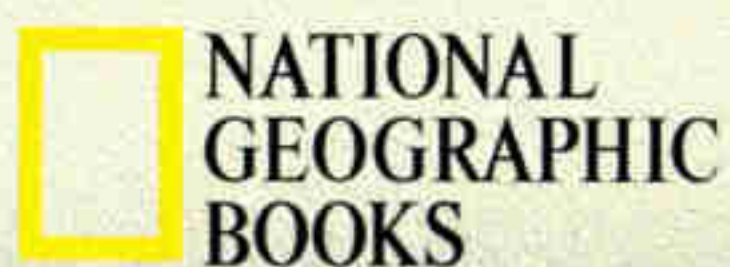
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ONE THAT ALMOST GOT AWAY

Final Edit



LAKE WOBEGON

A Life on the Land

Muscle and machine stand ready for work on the Kerfeld farm in central Minnesota, where Matt, 17, watches his dad head out to bale alfalfa hay. "You can feel the human connection to the landscape," says photographer Richard Olsenius, a Minnesota native. "This is my James Dean picture."

There was some disagreement about cutting this shot from the article. Designer Robert Gray thought the image was arresting but felt it looked too much like an advertisement. All agreed that black-and-white photography suits the story by Garrison Keillor. "It strips an image to its essentials," says Olsenius. "Black-and-white photography is like radio," adds illustrations editor Susan Welchman. "Both require imagination."

MORE ON OUR WEBSITE

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ON THE ROAD, IN THE FIELD,

NORTH POLE, ALASKA

Truly Warm

*A cold-weather
photographer watches
Santa melt kids' hearts*

Yes, Kris Kringel, there really is a GEOGRAPHIC photographer named Maria Stenzel (below), and she thinks you're an excellent Santa's helper. Maria, who has been to



MARIA STENZEL (ABOVE); RICHARD OLSENIUS

Siberia once and Antarctica twice for the magazine—"I think they assigned me to the North Pole story because I'm the cold-weather person"—watched as the self-named Kringel took gift requests from youngsters at a shop called Santa Claus House. The only present Maria wanted was time to explore the outskirts of this isolated town—snowmobiling through the winter wonderland.



ST. WENDEL, MINNESOTA

A Fresh Eye On the Familiar

Looking for roots, and readers, in Minnesota

GOVERNMENT

C O V E R I N G T H E W O R L D

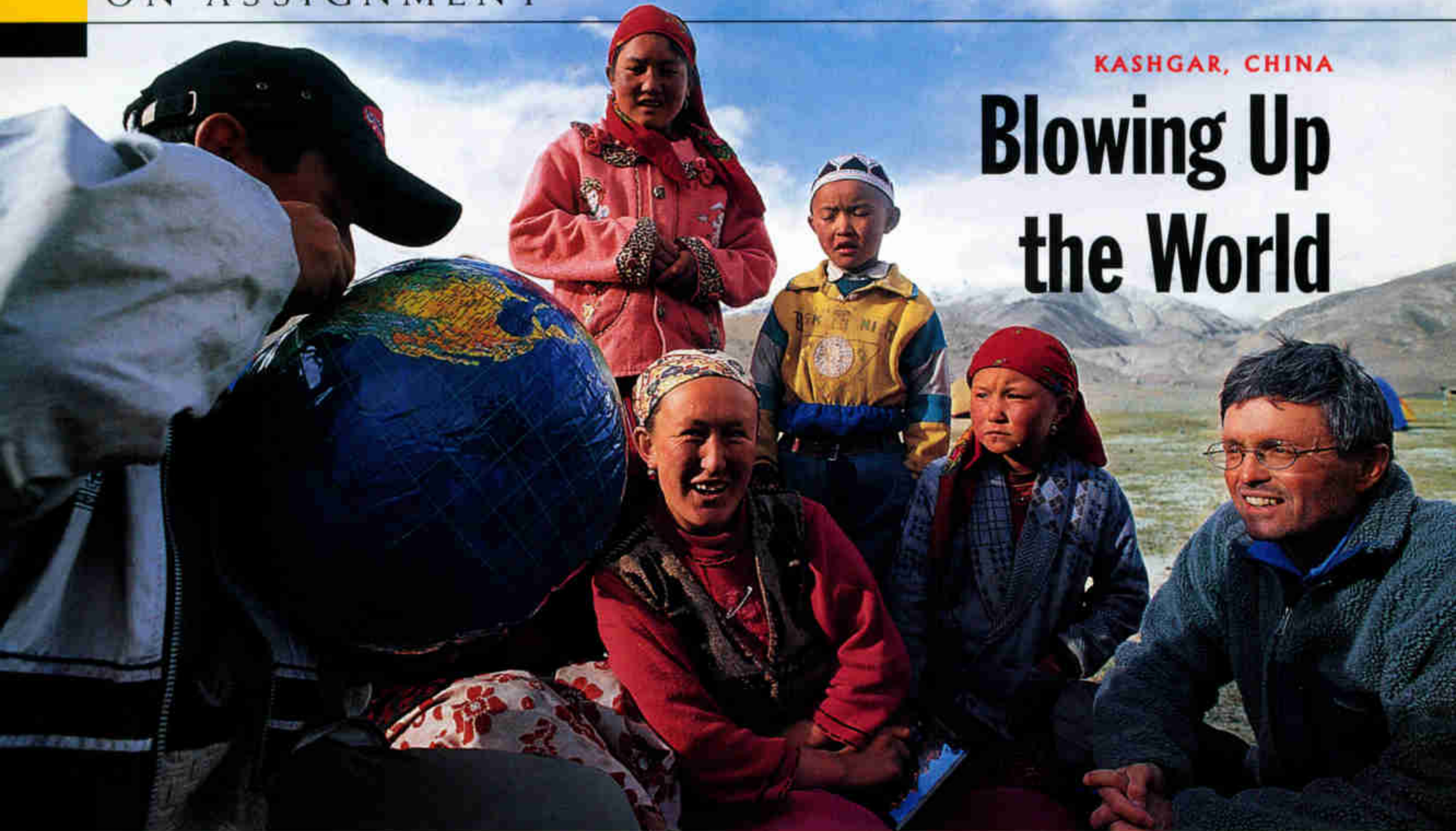


In a bar that could be Lake Wobegon's Sidetrack Tap but really is John Achmann's tavern in St. Wendel, Minnesota, Garrison Keillor finds familiarity—something he also has with the *GEOGRAPHIC*. This month's article is his second for the magazine. "I've written about places I care about deeply: Denmark and central Minnesota,"

says the host of public radio's *Prairie Home Companion*. "Both pieces turned out to be much harder than I expected. But the audience makes it worthwhile. It's a magazine that's like a book. People sit and peruse back issues, and so one hopes for readers next year and the year after that. And if there are readers, then it's worth it."

KASHGAR, CHINA

Blowing Up the World



GORDON WILTSIE

Jeremy Schmidt, at right, takes an inflatable globe with him wherever he travels on writing assignments. Blowing it up, as his guide in Kashgar does here, “is a way to get people to understand where you are from

and where they are. It’s a great conversation starter and good entertainment too.” Jeremy first went to Kashgar in 1987 during a nine-month trip through Asia; the Shipton’s arch expedition was his first return visit. “I was

afraid this beautiful old city had been overrun by a modern invasion,” he says. “I was pleasantly surprised to see that it still had the feeling of an outpost, with mud-brick buildings and shady lanes.”

WORLDWIDE

A fourth-generation New Zealander and the founding editor of *New Zealand Geographic*, writer **Kennedy Warne** holds a master’s degree in marine zoology. He’s been fascinated by his nation’s Fiordland since his magazine published a photo-essay about one of its walking tracks in its 1989 debut issue. Kennedy (right, at left) and driver Paul Roff travel the Wairaurahiri River in a jetboat—invented by a New Zealander, Kennedy notes proudly.

When German freelance photographer **Norbert Rosing** went to Canada in 1988 to shoot the northern lights, residents of Churchill, Manitoba, told him he should come back later to photograph the local polar bears. At first Norbert wasn’t interested.



ANNIE GRIFFITHS BELT

But after he returned in 1989 and observed the huge creatures, he “got the polar bear bug.” He’s been back every year since, often with his wife, Elli, traveling throughout the bears’ range in Canada to amass thousands of images. “I will keep on doing it as long as I can,” he vows.

Richard Olsenius moved to Minnesota at the age of six. He grew up to work for more than a decade as a photographer on the

Minneapolis *Star-Tribune*, specializing in images of small-town life. So when he went in search of Lake Wobegon, it was like going home. “This was a treat, to plant myself in central Minnesota and have

the time to dig deep into an area I knew well but never was able to devote that much effort to,” he says. Richard freelanced for the *GEOGRAPHIC*, then joined the magazine as an illustrations editor before leaving to heed “the call of the open road.” He lives in Annapolis, Maryland.

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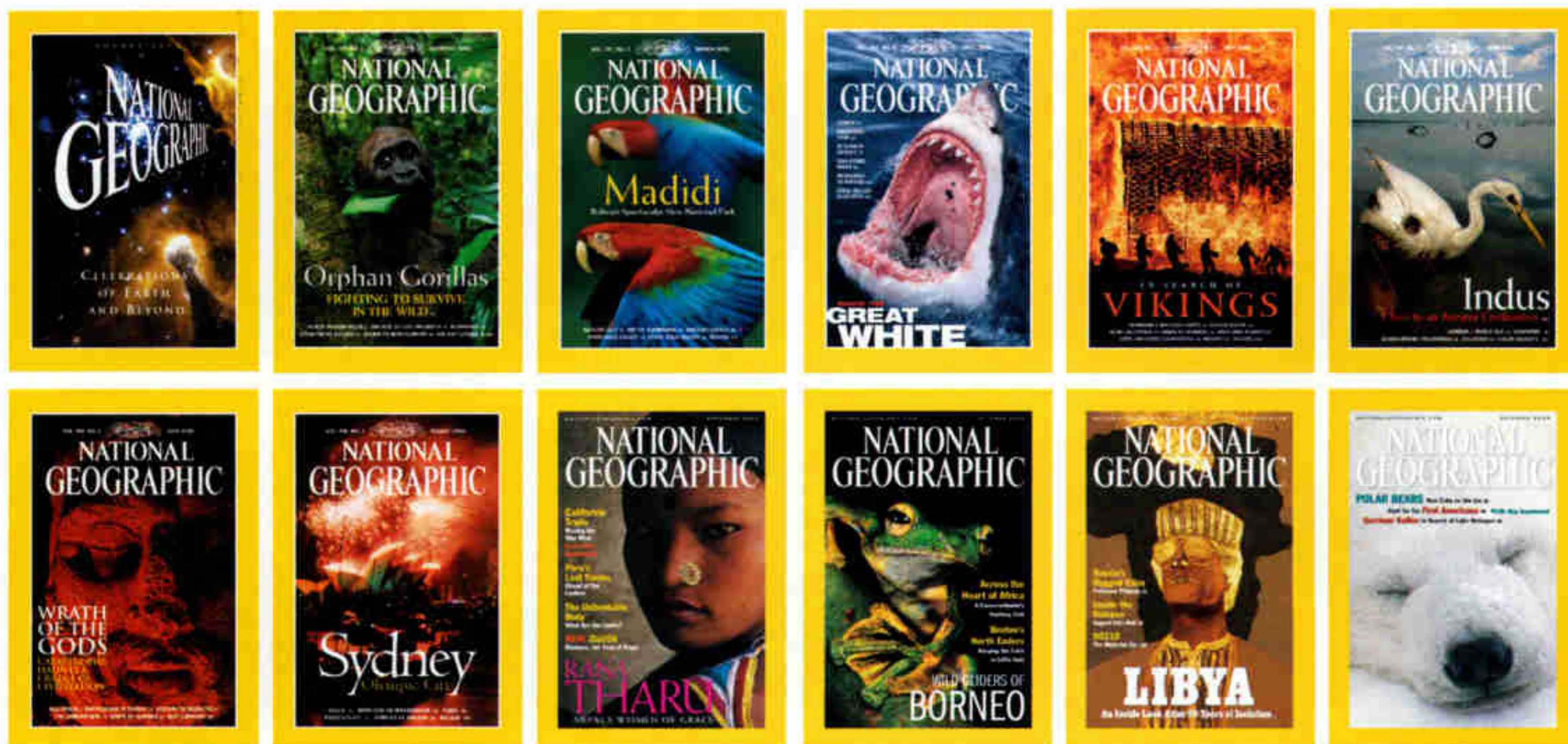
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Flashback



ANTHONY FIALA

POLAR BEARS

Cub in a Tub

This orphaned polar bear cub was adopted by members of a 1905 Arctic expedition after they shot its mother, who had been circling their boat in search of food. “We lassoed the cub and brought it to the ship,” recounted expedition leader W. S. Champ in our January 1906 issue. But the little bear was frantic. “I was going down the gangway when the thought struck me. If I can get the skin of the mother to this cub, possibly it will quiet her.” The older bear’s pelt was fetched, and the cub, which turned out to be a male, was comforted. He was caged for the rest of the journey—except at bath time—and sent to the National Zoo in Washington, D.C., where he lived until his death in 1936.

This photograph has never before been published in the magazine.

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